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In this Issue—

INFUSION BLASTING IN SOLID COAL
President's Address to North Wales, NACM - - page 179

OPERATIONAL RESEARCH
Investigations Conducted for the Steel Industry - - page 189

ULTRA-HIGH-TENSILE STEEL
Ford Research Development - - - - - - page 196

THE YORKSHIRE COALFIELD
North-Eastern Divisional Report for 1959 - - page 197

MINING OVERSEA
Some Recent Developments Reviewed - - - page 199

	PAGE
Leading Article: Coal in 1960	169
India's Heavy Electrical Equipment Project	170
Capital Expenditure in 1960	170
Reasons for Colvilles' Reduced Outputs	170
Auchengeich Pit Disaster	171
Scrip Issue Proposed by Arthur Lee & Sons	172
Mr. Geoffrey Kirk is Coal Board PRO	172
Big Contracts for RTB Spencer Works	173
Manufacturers and Price Cuts	174
ECSC Steel Output Beats 1957 Record	174
Bilston Death of Conscientious Chargehand	174
North-Eastern Coalfield	175
Coal Stocks—Economist's Dream	176
G.W.B. Electric Furnaces for United Steel Project	176
British-built Nuclear Research Reactor in Denmark	176
Steel Pendulum	177
Reconnaissance Survey for Uranium	177
English Steel's Research Director	178
Metal Industries Steps Up Bid for Lancashire Dynamo	178
Hydraulic Ram with Independent Control Valve	186
Detachable Prop Base	187
Forthcoming Events	188
New Range of Underground Conveyor Belts	198
Trepanner Haulage Tension Device	198
Passing Thoughts	200
Coal Consumers' Stocks	201
Coal for Barnsley at Snail-pace Speed	201
Appointments	202
East Midlands Mining Manpower	203
Brodsworth Miners Return to Work	203
Living With Full Employment May Prove Difficult	204
Heavy Capital Spending by Lancashire Steel	204
Company News	205
Birlec's Contract for Continuous Pusher Furnaces	206
Iron and Steel Trade	207
US Contract Award Provokes British Protest	207
Industrial Grants to University of Wales	207
Coal Stocks and Output	208
West Germany Reverses Coal Output Decline	208
Paradoxical Position in Notts Coalfield	208
The Coal Trade	209
Law Cases	209
Non-ferrous Metals	210
Obituary	210
Personal	211
Minister of Power's North-east Tour	212
Coalfield News	213
Coal Research is "Quite Inadequate"	213
Orders Placed	214
The Scrap Markets	214
News in Brief	216
Board Changes	218
European Coal Output	218
Increases of Capital	220
Rise in Some European Steel Prices	220

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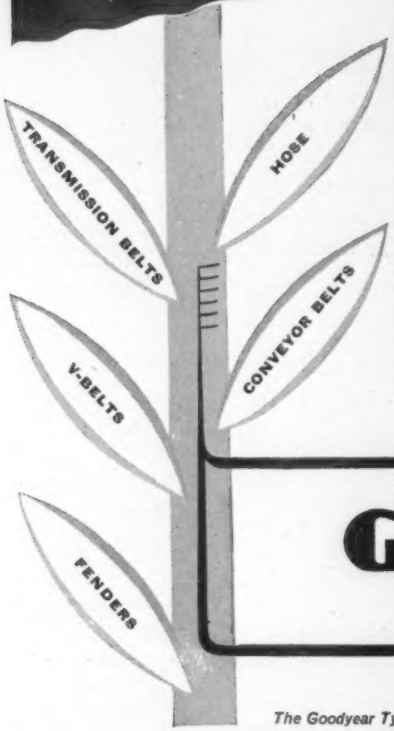

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IRON AND COAL
TRADES REVIEW

Vol. 180 January 22, 1960 No. 4,775

Coal in 1960

THE coal industry made more rapid advances in operational efficiency last year than in any other year since nationalization. That is the one comforting fact in the 1959 record of the industry, now statistically disclosed. Saleable output of deep-mined coal fell from 201,470,000 tons in 1958 to 195,270,000 tons in 1959, a decrease of 3.1 per cent. Open-cast output, deliberately cut back by the National Coal Board, was only 10,830,000 tons last year, compared with 14,350,000 tons, a decline of 24.5 per cent. Total output, at 206,100,000 tons, was 4.5 per cent. below the 1958 figure of 215,820,000 tons.

The NCB's task in 1959 was to meet a continuing and substantial fall in the demand for coal without causing extreme hardship to the mining community or seriously reducing the industry's future production capacity. It has attained a measure of success in fulfilling this dual task which is highly commendable in view of the difficulties. Inland consumption fell by 28,000,000 tons between 1956 and 1959. The last time the industry suffered a similar fall in demand was between 1929 and 1932. At the end of 1932, 350,000 miners were unemployed, and almost all of those who remained in the industry were working short time. In contrast, because of the use of natural wastage to reduce the labour force and the buffer effect of stocking, there has been little redundancy this time. Granted that conditions in the two periods are not strictly comparable, we can be grateful that we have been spared the upheaval which would have been caused by throwing large numbers of miners out of work. The three years during which stocks of coal have been increasing have been used by the board to reduce output to a level nearer to that of the demand. As Sir James Bowman pointed out last week, to have made the same reduction in one year would have been catastrophic in its effect on the mining community, and large numbers of unemployed miners would have seriously affected the country's economy. By spreading remedial measures over three years, the NCB has produced some coal before it was needed, but by so doing has been able to control the reduction in the industry's size, and cope with the consequences.

The board plans this year to restrict deep-mined output to 188,000,000 tons, compared with 195,270,000 tons in 1959. Open-cast output will come down to 7,000,000 tons, giving a total production of 195,000,000 tons in 1960 against 206,000,000 tons last year. In pursuit of its aim not to impair seriously the industry's production capacity the board is planning its operations over the current year to take care of any sudden upsurge in the demand. It is believed that 210,000,000 or 215,000,000 tons could be produced in 1960. Let us hope that markets will materialize. Demand can rise as quickly as it can fall. The general economy is expanding, and with it must surely come a bigger demand for energy in which coal can expect to share. It is gratifying, therefore, to know that output of coal can be stepped up if the need arises.

The board, however, is not at present banking on a substantial increase in demand. After consultation with the Government and the main consumers, it estimates that total consumption during this year will be about 196,000,000 tons—slightly more than in 1959. Nevertheless, it is evident that output will have to be reduced below the 1959 level. To get open-cast production down by 4,000,000 tons, no new contracts are being let as work finishes on existing sites. This is the maximum reduction that can be achieved without breaking existing contracts and involving the board in heavy financial penalties. Open-cast output is profitable, and the decision to cut it was a difficult one to take. During 1960 it is planned to close about 46 collieries. Most of these are reaching the end of their workable reserves. Only half-a-dozen of these collieries will be closing because they are uneconomic or because they are producing low-quality coal. In most coalfields recruitment, as in 1959, will again be confined to craftsmen and juveniles. Some districts must maintain the existing manpower level and normal recruitment has already been resumed in parts of the Midlands, Yorkshire, and South Wales. Overall recruitment into the industry will be higher than in 1959, but wastage, too, will be greater as a result of the universal retirement of men aged 65 and over which is planned for the first quarter of the year. The net effect will be to reduce manpower from about 640,000 at present to about 595,000 at the end of 1960. This compares with a reduction of 47,000 in 1959.

These measures should bring production down to a level below the estimated rate of demand. It can be expected, therefore, that there will be no net addition to stocks in 1960, but a reduction as the demand for energy increases in line with the expansion in the national economy which is generally expected.

Technically the coal industry has made great advances, and but for the high cost of putting coal

to stock the Coal Board's finances would have improved in 1959. Productivity was at record levels and the improvements of 6 per cent. in faceworkers' output a manshift during the year, and of 5.3 per cent. overall, were the biggest increases recorded for more than 30 years. This improvement in productivity was largely responsible for a fall in production costs of about 1s. 9d. a ton compared with 1958, although the burden of overheads was higher because of reduced outputs. Progress of this kind augurs well for the future.

The accounts for 1959 are not yet available, but it is known that a deficit was incurred, wholly accounted for by costs incurred through stocking, as, indeed, was the case in 1958 also. When output is more nearly related to demand, the coal industry will be in a much stronger economic position.

India's Heavy Electrical Equipment Project

EXPANSION plans which will raise the manufacturing capacity of the heavy electrical equipment project at Bhopal, India, to Rs. 500,000,000 (£37,500,000) yearly in 10 years in two five-year stages have been agreed by Associated Electrical Industries, Limited, consulting engineers to the Indian Government for the project. Lord Chandos, chairman of AEI, told a Press conference in New Delhi on Monday that the total cost of the fully-commissioned project would be £85,000,000, including fixed capital of £47,000,000 and £18,000,000 in foreign exchange for components.

AEI was neither financing the project nor was it supplying the machinery, he said, but the company hoped to arrange credit with British banks. His company was to establish a £750,000 cable factory near Bombay which was expected to go into production in 18 months.

Discussions are going on between the Government of India's Railways Department and AEI for a contract for the construction of electric motors at Chittaranjan, India's largest factory for building locomotive diesel motors, and Lord Chandos is expected to join in the talks when he arrives at Chittaranjan on January 28.

Scientific Instrument Exhibition in Moscow

AS a result of a report by a three-man delegation from the Scientific Instrument Manufacturers' Association of Great Britain which went to Moscow last November and with the support of SIMA's 30 members, an exhibition of British scientific instruments will be held in Moscow from June 16 to 26.

The exhibition will be the first to be put on in Russia by a British organization of manufacturers in a specialized field. It is possible that some additional exhibitors will participate and further inquiries are still being received.

SHEPCOTE LANE ROLLING MILLS, LIMITED—Mr. H. Morley, a director of Samuel Fox & Company, Limited, has been appointed a director.

Capital Expenditure in 1960

LATEST Board of Trade survey into industry's investment plans confirms previous estimates that a new phase of major industrial expansion is on its way. Fixed capital spending by private industry should rise by 16 per cent. this year, manufacturing industry being expected to increase its spending by 14 per cent. A previous survey carried out last summer forecast a slight net fall in capital spending in the private sector in 1960.

Two major industries—steel and motor-cars—plan to raise their capital spending by about 50 per cent.—in contrast to the much more reserved estimate of "no change" made six months ago. The plans of these two industries colour the whole outlook as other sectors of manufacturing industry put their increase in capital spending at a conservative 4 per cent. Manufacturing industry would appear to be planning to step up its outlay on plant, machinery, and vehicles by 17 per cent., compared with a 10 per cent. drop forecast last summer, and by 8 per cent. on new building.

The Board of Trade suggests that the forecast may be too optimistic since "when a significant increase in capital investment is being planned experience suggests that achievements may well fall short of intentions." For instance, the 50 per cent. rise in steel expansion may include the strip mill planned by the Steel Company of Wales, Limited, approval for which has not yet been given by the Iron and Steel Board.

Whatever the extent of the upsurge in industrial expansion there is little doubt, not only that it is on its way, but that it is much more firmly based than it was last year when the boom was largely confined to consumer goods.

Reasons for Colvilles' Reduced Outputs

CONSTRUCTION of the new slabbing mill at Ravenscraig is proceeding steadily, state the directors of Colvilles, Limited, in their report for the year ended September 30, 1959. Satisfactory progress has been made with the design and ordering of the equipment for the strip mill and the preparation of the sites at Ravenscraig and Gartcosh is well advanced.

Rearrangement of previous development schemes consequent on the approval of the strip mill has been completed and approved by the appropriate authorities. The schemes include the installation of a four-high plate mill at Clydebridge and alterations to the section mills at the Lanarkshire Steel Company's works to equip them to produce universal beams.

Output of the group was:—Steel ingots and castings, 1,442,312 tons (1,847,063 tons in the previous year); pig-iron, 673,163 (918,942) tons; coke, 468,132 (783,364) tons. Commenting on the fall in output, the directors state that it reflects the reduction in works' stocks of semi-finished and finished material which it was possible to effect and also the fall in demand.

All present indications point to an increasing pressure of demand for all classes of steel, the directors add.

ROYSTON INDUSTRIES, LIMITED—Mr. J. D. Heslop has resigned from the board, but remains a director of the subsidiary, Heslop & Company, Limited.

Auchengeich Pit Disaster

FINAL SUBMISSIONS AT PUBLIC INQUIRY

FAILURE of the fan belt manufacturers to supply belting that conformed to the specifications ordered by the National Coal Board had been shown to be the "essential cause" of the disaster at Auchengeich Colliery last September when 47 Scottish miners lost their lives. This submission was made by Mr. J. O. M. Hunter, QC, for the Coal Board last Friday, the final day of the public inquiry into the disaster. It has been conducted by Mr. T. A. Rogers, HM Chief Inspector of Mines, acting as Commissioner for the Ministry of Power.

Mr. Hunter said that the evidence of 82 witnesses had shown that the failure of the fan belt had "set in train a series of events which might be regarded as inevitable. That was a misfortune, but it was a misfortune for which neither the board nor its officials should bear responsibility." The board had ordered, and was entitled to receive, an article of belting of a particular quality and strength; it did not receive that article and a defect in it could not have been discovered by any reasonable examination on receipt.

"We now know it was not of 33½-oz. material and was not up to British Standard Specification 2066 in respect of elongation and ply separation and these were the defects which caused the failure of the belt on September 18. A situation must be assumed where the wrong article was supplied, but where all concerned believed that the correct article was supplied. The belt and its quality was the central issue on which practically everything else depended, Mr. Hunter submitted.

Precautions Taken by NCB

After considering in detail the terms of the contract with the belt manufacturers, Mr. Hunter observed: "It was a contract most carefully drawn, and, speaking as a lawyer, I fail to see what further precautions the board could have taken. Before the main contract was placed an inspector visited the belt factory and reported that the manufacturer had all the necessary equipment and facilities to produce belting of the required specification. Further inspections were made, samples were taken, and tests carried out. It was quite plain that the belt ordered was of adequate strength to perform the duty it was called upon to perform—and this dismissed the attempt which had been made to suggest that the speeding up of the fan in June was the cause of the trouble which emerged on September 18.

Mr. Abe Moffat, president of the Scottish Area of the NUM, appearing for the union, suggested that regulations at the colliery were neglected and ignored. There was no doubt about the cause of the fire; it was apparent that the belt was defective. Here they had an inferior belt; they had plenty of oil to spread the fire into the return airway where there was plenty of timber and no fire protection at all.

He was staggered by the revelation of how the belt came to Auchengeich. Without any consultation with those at the colliery the manufacturers changed the order, he alleged, and sent a belt which was under specified British Standards. What took place at the colliery immediately after the fire broke out was further proof that human life was given secondary consideration. While travelling down the return airway the official in charge of 18 or 20 men recognized the danger and told them to go to the intake airway. No thought was given to the men coming behind.

Commenting on the fire-fighting arrangements at the pit, Mr. Moffat spoke of a deplorable situation "where a fire broke out and one and a half hours elapsed before effective fire-fighting took place."

"Here," he said, "we have a clear example of production receiving priority over safety, but at great cost of human lives and eventually the cessation of production for several months."

Mr. Harald Leslie, QC, for the National Association of Colliery Overmen, Deputies, and Shotfirers, said he agreed with Mr. Moffat but for one point. The association lost seven men in the disaster and he considered it unreasonable to claim that the officials had no concern for the safety of the men. It was slanderous—and against the evidence—to say so because the officials were not "suicidally inclined" and were "not uninterested in the lives of everyone in the pit."

There was also the deplorable fact, Mr. Leslie added, of sabotage affecting fire-fighting equipment at the pit and it had been shown that if most of the men were safety conscious there were still a few "so insane and inane that they will wreck the lifebelt that will save human life."

"No matter what has been said about extinguishers or hoses can any one imagine how Dickson felt when he first saw the fire on the belt? He says to himself: 'Here's an extinguisher. Get the belt out and all's well.' But the extinguisher has been sabotaged. He gets another—same state. Never mind, he'll get the hoses. Someone has sold the brass nozzles—for pieces of silver."

Sir Andrew Bryan, who appeared for the National Association of Colliery Managers and the British Association of Colliery Management, joined others in tribute to the heroism of the miners who took part in rescue work. All parties at the inquiry would be glad to learn, he said, that an instruction had now been issued for constant attendance on any underground fan driven by an inflammable belt.

In his closing speech, Mr. Henry Hyde, for the Ministry of Power, spoke of the gallant effort at rescue in conditions which were not only difficult but dangerous. "I feel honoured to put on record that all fully maintained the high standard of bravery which is the tradition of all those who go underground to win coal," he said.

Stating that he would complete his report in as short a time as possible, Mr. Rogers said: "I shall at all times in writing my report have very much in mind any measures which those of us engaged in mining may be able to take with a view to ensuring that never

again shall we find it necessary to inquire into a disaster such as the one which occurred at Auchengeich." Before formally closing the inquiry Mr. Rogers called for a short silence as a mark of respect for the men who lost their lives in the disaster.

The Area production manager, Mr. James Robertson Cowan (40), who was manager at Auchengeich from 1948 to 1951, was cross-examined by Mr. Moffat on Wednesday of last week on a paper he had read on the booster fan at the colliery. Mr. Cowan explained that he had used the fan as a means of conveying information relative to the network theory of ventilation. It had been installed to boost ventilation because of "serious difficulties" in the main coal section. There was a fairly high gas content there. He agreed that there were many difficulties associated with a booster fan of this type and that there should always be the utmost care in dealing with it.

Asked about safety regulations, Mr. Cowan said he did not think there were too many. The average official could be expected to become proficient in them even if he was only provided with a copy of the regulations. A training course for deputies was run every year.

Principal witness on Thursday of last week was the Area general manager, Mr. David Lang (63). Officials at the colliery, he said, had done all in their power to stop interference with medical supplies and fire equipment underground. All kinds of expedients had been adopted, such as enclosing ambulance and fire-fighting equipment, but without effect.

He agreed that if a continuous shift on the fan was arranged and the "homicidal vandalism" got over, the risk to human life would be diminished. Officials such as deputies and overmen had taken a great interest in safety outside their statutory duties.

No Difference

Although, up to the time of the disaster the balata belting used at the colliery had given no trouble, in view of what had happened, he did not think it should be used. He thought the fire arose from excessive stretch on the belt causing excessive slipping, in turn causing ply separation. Ultimately he thought the belt broke down and must have become jammed in the motor pulley and then caught fire. Since there was a high velocity of ventilating current, incandescent fibres from the belt were blown down the return airway "and we actually had several fires going at the same time," Mr. Lang said.

He told Mr. Hunter that it made no difference if the booster fan was stopped for an hour or so as the main ventilation of the pit came from the fan on the surface which circulated over 15,000 cub. ft. of air a minute.

Mr. Francis Hartwell, senior scientific officer of the Safety in Mines Research Establishment, Buxton (Derbyshire), told Sir Andrew Bryan that he thought if a hose had been available with an adequate supply of water at the time the fire at the fan was discovered by Mr. Dickson, it could have been extinguished.

Mr. Bernard Leslie Metcalfe (58), chief engineer, NCB headquarters, said that tests had been carried out on a number of belts so that steps could be taken to introduce belting which was fire resistant. Although most passed the fire-resistant tests they did not pass the anti-static tests. Investigations were still being carried out.

He went on to say that 80 ft. of belting had been supplied to Auchengeich at the beginning of September against a bulk order. "It does appear that this piece of belt was just one piece on its own which was sub-standard." His view was that they would tend to eliminate flat transmission belts underground as quickly as they could. Since the disaster there had been an instruction that a man should be in constant attendance on all booster fans driven by this method.

Cross-examined by Mr. Moffat, Mr. Metcalfe said he would not accept that it was "worse than sabotage" to have supplied this piece of belting, which was admittedly under British Standards specification, because it had not been deliberate. Nor did he think there was anything wrong in the supplier of belting being changed without the senior officials at the pit being consulted.

Scrip Issue Proposed by Arthur Lee & Sons

PROPOSAL to capitalize a substantial portion of the share premium account of £1,741,818 by means of a scrip issue is announced in his annual review by Mr. G. Wilton Lee, chairman of Arthur Lee & Sons, Limited, manufacturers of steel strip, bright drawn bars, wire, etc., of Sheffield. As a first step it is proposed to increase the authorized capital in the near future and appropriate details will be sent to shareholders in due course.

With regard to what at first sight might be regarded as an "unduly conservative" dividend policy (17½ per cent. for 1958-59), Mr. Lee submits that this was the correct course in view of the threat of renationalization which precluded the raising of capital to finance expansion. More than £2,800,000 has been spent on expansion and modernization in the last eight years and with the removal of the nationalization threat the board will be able to raise fresh capital if necessary for the greater expansion of the business.

In every department order-books for home sales are satisfactory and immediate prospects appear favourable so long as serious cost increases can be avoided. Despite severe competition export sales have been kept at much the same level of turnover and profit and immediate prospects appear reasonably good.

Mr. Geoffrey Kirk is Coal Board PRO

APPOINTMENT of Mr. Geoffrey Kirk as its chief public relations officer was announced by the National Coal Board on Wednesday. Mr. Kirk, who has been the board's chief Press officer since April, 1955, will now take over responsibility for the public relations branch of the NCB. His promotion follows the recent appointment of Mr. Noel Gee, previously NCB director of public relations, as staff director of the East Midlands Divisional Coal Board.

After leaving Chesterfield Grammar School, Mr. Kirk, who is 38, worked for two years in the Bolsover Colliery office. He joined the Royal Navy in November, 1939, and took part in the evacuation from Dunkirk. He then served for two and a half years in the Eastern Mediterranean aboard an anti-aircraft cruiser. Later, he qualified as a diver and was a member of the Admiralty experimental diving unit. From 1946 to 1948, Mr. Kirk was a reporter on the staff of the Surrey Advertiser, Guildford, and then had a year on the Evening Advertiser, Swindon. He joined the NCB Press office in 1949. He was appointed a Justice of the Peace for Reigate Borough in August, 1958.

BIG CONTRACTS FOR RTB SPENCER WORKS

Senior Appointments Also Announced

CONTRACTS—two of them worth £2,000,000 each—for the Spencer Works of Richard Thomas & Baldwins, Limited, now under construction at Llanwern, near Newport (Mon), have been placed. The appointment of Mr. W. O. Campbell Adamson as general manager of the Spencer Works was announced last July. The company now announces the appointment of seven more senior men, including Mr. L. B. Davies as commercial manager, Mr. K. Hollingsworth as manager of the staff and labour relations department, and Mr. D. R. Knights as traffic manager.

Main contract for the supply of sinter plant, most of which will be manufactured in the United Kingdom to Lurgi specification, has been awarded to Lurgi Apparatebau - Gesellschaft. James Howden & Company, Limited, Glasgow, which recently concluded an agreement with the German company, is the main British firm involved.

MR. W. O. C. ADAMSON

The sinter plant is expected to be in commission by September of next year. When in operation each unit of the plant will be the largest of its kind in the UK. The complete plant includes two sinter machines, the capacity being 50,000 tons of blast-furnace sinter per week. The other contract, which has gone to the mechanical handling department of Mitchell Engineering, Limited, Peterborough, is understood to be one of the largest ever awarded for mechanical handling equipment in the UK. The contract covers ore and coal screening, crushing, and conveying machinery, in addition to storage plant. This contract is due to be completed by March of next year.

River Board's Objection

The Usk River Board has decided to lodge an objection to the draft order which Newport Corporation is submitting to the Ministry of Housing and Local Government in connection with the supply of water to the Spencer Works. The objection is to enable the board to negotiate various points with which it is specially concerned. Newport Corporation is seeking power to take 8,000,000 gallons of water a day from the river Usk at Llantrissent until the Llandegveth reservoir scheme, being undertaken by the Cardiff City Corporation, becomes available, and subsequently if the flow at Trostre in connection with the Llandegveth scheme falls below 150,000,000 gallons a day.

It is desired to increase this abstraction to 14,000,000 gallons a day when the requirements of the steelworks increase, together with 3,000,000 gallons a day from the river Afon Llwyd and a further quantity limited to 3,000,000 gallons a day at Llantrissent if an emergency should deprive the steelworks of the water it anticipates obtaining from the Severn Tunnel.

The general manager of the Spencer Works, Mr. W. O. Campbell Adamson, is 37. He entered the Home Office and later was at the Royal Institute of International Affairs before joining the staff of Baldwins, Limited, in 1944 as a management trainee at head office. On the formation of Richard Thomas & Baldwins he spent some time in each of the company's works. In 1947 Mr. Adamson was appointed assistant labour relations officer to the West Wales section of RTB and later became the labour officer for the section. In 1950 he was appointed assistant to Mr. Cedric T. Thomas, then general manager of the West Wales group, and in 1952 he became personnel superintendent of the steel division of the Steel Company of Wales, Limited.

Mr. Adamson joined the Redbourn Works of RTB as assistant general manager in 1954, and was appointed general manager in 1957.

MR. L. B. DAVIES

Mr. Luther B. Davies, the commercial manager, is 52. He joined the Grovesend Steel & Tinplate Company, Limited, at Gorseinon in 1923. Ten years later he went to the Redbourn Works at Scunthorpe as assistant in the commercial department. In 1946 he was appointed commercial manager of the Redbourn section and transferred to London as chief commercial manager of Richard Thomas & Baldwins in 1954.

Mr. Davies is a member of the Raw Materials Co-ordinating Committee and the Scrap Management Committee of the British Iron and Steel Federation, and of the Coke Export Committee of the British Coking Industry Association.

Mr. Kenneth Hollingsworth, appointed manager of the staff and labour relations department, spent 10 years with the Redbourn Hill Iron & Coal Company, Limited, before joining the wages department of the Richard Thomas Company's Redbourn Works in 1933. In 1943 he was appointed labour officer, and, in 1958, personnel manager. Mr. Hollingsworth is vice-chairman of the Wages Committee of the Lincolnshire Iron

Masters' Association, a member of the Standing Committee of the Iron and Steel Trades Employers' Association, and holds several other appointments.

Mr. David Benallick, who is to be the chief accountant and general office manager, joined Richard Thomas & Company as assistant to the accountant at the company's London office in 1938. In 1947 he was appointed personal assistant to the then managing director; from 1952 to 1954, he was in charge of capital expenditure, and in 1955 he moved to Ebbw Vale as personal assistant to the office manager.

Mr. Frederick C. H. Fone, who is appointed office manager, joined the South Wales Tinplate Corporation, Limited, in 1933, transferring in the following year to the accounts department at the head office of Richard Thomas & Company. After war service he rejoined Richard Thomas & Baldwins in its property department. Mr. Douglas R. Knights, traffic manager, received his early training in the chief mechanical engineer's department of the Great Western Railway. During the war he served in North Africa, Italy, and Austria, and then moved to the Canal Zone, Egypt, as deputy assistant director of transportation. He retired from the Army last June.

Dr. Geoffrey G. Mathew, who is appointed medical officer, occupied a similar position with Stewarts and Lloyds, Limited, at Newport and Swansea before joining RTB in 1953 as medical officer of the West Wales section. Three years later he was appointed head of the company's central medical laboratory at Gorseinon and medical officer of the Landore group of works. The public relations officer of the Spencer Works, Mr. Wilfrid M. Goatman, joined RTB in 1953 as information officer at its Ebbw Vale Works, subsequently becoming information and public relations officer for the Ebbw Vale and Panteg sections.

Manufacturers and Price Cuts

APPEAL by the Chancellor of the Exchequer to UK manufacturers to cut prices where possible has met with sympathetic (if qualified) response by the Federation of British Industries and the National Union of Manufacturers. In an open letter to the Chancellor, Mr. W. H. McFadzean, president of FBI and chairman and managing director of British Insulated Callender's Cables, Limited, points out that competition, whether in price, quality, or service, is in most cases the greatest single factor which companies have to take into account.

Each company must determine its prices according to its assessment of its costs, the challenge offered by competitors, and the long-term interests of its own business and the country as a whole, the general prosperity of which has an important influence on the prosperity of any individual concern. Competition, he warns, will become even more intense as discrimination against dollar and other supplies is progressively eliminated and as the European Free Trade Association comes into operation.

The president of the National Union of Manufacturers, Mr. Morton Oliphant, supporting the Chancellor's plea, adds that the decision must be left in the hands of individual companies—each manufacturer considering his own course of action in the light of his own circumstances. Mr. Oliphant also stresses that competition would be the most important factor in deciding the course.

ECSC Steel Output Beats 1957 Record

OUTPUT of crude steel (ingots and castings) in the European Coal and Steel Community in 1959 reached the record total of 63,142,000 metric tons. This was 8.9 per cent. above the 57,997,000 tons of 1958 and 5.5 per cent. more than the previous record total of 59,804,000 tons produced in 1957. All six Community countries contributed to the record, the greatest percentage increases occurring in West Germany (13.3 per cent.) and the Netherlands (16.3 per cent.).

Output of pig-iron and ferro-alloys was also a record, reaching 46,669,000 tons, 7.2 per cent. more than the 43,516,000 tons produced in 1958 and 3.5 per cent. more than the 1957 record of 45,113,000 tons.

Orders for rolled steel products reached the all-time record level of 50,266,000 tons, 34 per cent. more than the 1958 total of 37,509,000 tons and 19 per cent. more than the previous record reached in 1956. The revival of user demand coincided with a reversal of the stock trend, leading to an expansion in the steel industry which far surpassed the rate of general industrial expansion.

Despite the US steel strike, increased demand from countries outside the ECSC played a relatively small part in the boom. Orders from non-member countries rose by just over 2,500,000 tons (28.2 per cent.), while orders from inside the Community rose by 10,147,000 tons (nearly 36 per cent.). A notable feature was the increase in intra-Community trade; orders placed by ECSC users in Community countries other than their own rose by 64.9 per cent. to 7,095,000 (4,302,000) tons.

Orders for rolled steel products in December reached 4,428,000 tons, compared with 4,567,000 tons in November and 3,309,000 tons in December, 1958. While orders from inside the Community were slightly higher than the November level, there was a small decline in orders placed by non-member countries. Order-books for rolled products expanded by nearly 500,000 tons in October, the last month for which statistics are available. They reached 12,515,000 tons at the end of the month, against 12,032,000 tons in September and 9,031,000 tons a year earlier.

Bilston Death of Conscientious Chargehand

CORONER for South-West Staffordshire, Mr. D. F. Cave, said at a Bilston inquest recently that Mr. Arthur Jack Marson (48), a chargehand at the Bilston steleworks of Stewarts and Lloyds, Limited, had probably died because he was "over-zealous and over-conscientious." He was a man who would always persist in seeing that a job was done properly, but when he decided to look at pulleys in a liftshaft at the side of a gasholder it must have been a mental aberration as he had already instructed one of his assistants to have another look at a job that had just been completed at the top of the holder. The assistant used the lift and the descending heavy counterbalance killed Mr. Marson.

The jury returned a verdict of Accidental Death.

MORE THAN 40,000 tons of machine turf was produced last year by members of the Irish Machine Turf Development Association.

North-Eastern Coalfield

UNSURPASSED IMPROVEMENT IN PRODUCTIVITY

"WHAT has been achieved has not been any change of policy. The basic lines of development laid down in 1958 have not been altered in 1959, nor do we intend to do so in 1960. There will, of course, be modifications to meet changing circumstances of the present day, but the basic policy remains the same because it has proved successful." This quotation is taken from a survey of the conditions in the Yorkshire coalfield made by Mr. W. H. Sales, chairman of the North-Eastern Divisional Coal Board, at a Press conference at Doncaster on Monday.

Mr. Sales gave proof of the success of the "basic policy." During 1959, he said, saleable output during the five-day week had increased by 319,330 tons. Output per manshift at the face and overall had again reached record levels and the rate at which o.m.s. had improved over the last two years was unsurpassed in the recent history of the coalfield.

MR. W. H. SALES

Last year he had said that the coal industry in Yorkshire should be visualized as 900 primary producing units — the coal faces—and had asked three questions:—Is the coal face advancing fast enough? Is manpower deployed to the maximum efficiency? Are the men, the underofficials, and pit management working together as a team? He now concentrated on manpower deployment and team working as the two most immediate problems.

The Division's Achievement

Increased output had been achieved in spite of a fall in manpower of 7,882 men and had only been possible by a more effective deployment of manpower. It meant organizing to eliminate on the coal face the frustration of inefficiency and it was important to remove the bottlenecks that wasted men's labour and delayed the coal on its way out of the pit. He summed it up—"We have less men at the coal face, but a greater output. We have less men behind the coal face, but they are dealing with a greater output. That is our achievement."

Changes of magnitude were bound to create strains and the coal industry could not be transformed as it was being transformed in Yorkshire without such strains, but no section within the industry should be asked to bear unnecessary strain. Two things must be preserved—safety and the spirit of co-operation.

Though the division last year had lost 417,555 tons through strikes and go-slows, that loss was less by 245,666 tons than the previous year. Much as this loss was to be deplored it must be recognized that in the vast majority of cases men and management met and consulted on all the issues between them.

A particular problem facing them in 1960 was the important changes which would be caused by the need to concentrate production at collieries whose output was in most demand. To a large extent it was hoped to accomplish the changes by the process of wastage at pits where less output was required and recruitment at the selected pits where output was to be increased, and, said Mr. Sales, "there will be no redundancy if it can possibly be avoided. We do not wish the success of this industry to be built on the sacrifice of those within it."

The future lay greatly, if not wholly, with mechanization. The average face o.m.s. on conventional faces in 1959 was 4.34 tons (pithead), compared with 4.21 tons in 1958. On power-loaded faces it was 6.57 tons (pithead), an improvement on the 1958 figure of 5.95 tons. There were two Areas in which the average face o.m.s. on power-loading was now about 8 tons per manshift and there were at least 10 pits where in recent months it had been over 10 tons. That showed what could be done and it was the aim to obtain similar results on the other installations in the division. Until that had been done it would be foolish to expand unduly the power-loading programme.

However, the problem of improving face productivity was still basically the problem of the conventional face which contributed over 70 per cent. of the division's output. There were many improvements that could be carried through without complete mechanization.

Nothing had happened in 1959 to alter the Divisional Board's attitude towards reconstruction; it would best play its part when the coal faces and the pits, as they existed, worked with maximum efficiency. The reconstruction programme remained heavy. From vesting date to the end of 1959 capital investment in the Yorkshire coalfield had been £160,000,000, of which £118,000,000 was spent on collieries, £11,000,000 on coke ovens and by-product plants, £19,000,000 on mineworkers' houses, and £12,000,000 on central services including workshops and stores. Last year some £19,000,000 had been spent in the division on using the pits more effectively and replacing dying capacity. Both roles were and would remain important.

Turning to the future, Mr. Sales said it was not so black as some people would have them believe—indeed it could be very bright. Public discussion had tended to dwell upon increasing competition, particularly from oil, the price of coal, and the growth of coal stocks.

It was indisputable that oil was making inroads into coal markets, but in the present economy the correct

attitude could not be one of lament, but must be one which posed the question: "What can be done about it?"

"It is not sufficient to tout for customers," Mr. Sales declared. "We must be able to demonstrate on the basis of cost and efficiency that coal is a competitive fuel."

The coal industry was not outside the pressures inherent in the operation of economic forces and if the clamour for cheap coal simply meant the relentless pursuit of more and ever more economic and efficient methods of coal production, no one would disagree with the clamour. It had the merit of recognizing that "cheap" coal was not accompanied by "cheap" miners, since the more efficiently coal was produced the higher the wages which could be paid. It had the merit, too, of recognizing the powerful stimulus which "cheap" coal could have on the economy as a whole.

Some critics of coal stocks seemed to suggest that the NCB was ignorant of the need to marry production to demand. The industry, like any other economic activity, could not escape that need, but that was not to say that it must be met with catastrophic suddenness and with a total disregard of the men who had, over the years, served the industry and the nation.

Mr. Sales recalled the vast upsurge in coal production after the last war which made power available to industry at a lower price than purely commercial considerations justified and the voluntary foregoing by the miners of their five-day week to emphasize the debt owed to the men in the industry and to suggest that to deal with the new situation did not lie in panic measures to marry production to demand overnight but, as always, in careful thought and planning and co-operation with the Government and trade unions.

"No one suggests," he said, "that all are angels in a labour force of some 650,000, but I do suggest that the greatest asset this industry possesses is the goodwill of those who work in it and this being the case vicissitudes must be met not by vindictiveness, but by co-operation and human understanding."

Coal Stocks—"Economist's Dream"

"WE don't have to be ashamed or apologize for these stocks. They have been fulfilling the function of a nationalized industry as the economist had dreamed it might be done." These were the words of Mr. E. F. Schumacher, economic adviser to the National Coal Board, when he addressed the North Midland branch of the Coal Industry Society at Mansfield Woodhouse (Notts) on Thursday of last week. He had pointed out the value from a national point of view of the board's large stocks of coal.

Because of the boom in industry there would be a "tremendous destocking" of coal in 1961. Industry could enter the boom without the NCB having to bid for labour at a time when it might be difficult to obtain.

Dealing with competition from other forms of energy, Mr. Schumacher said that it would be wrong to be panic-stricken over the encroachment of oil. Oil sales represented the equivalent of 7,500,000 tons of coal out of sales of 28,000,000 tons in the last three years. As far as atomic energy was concerned, estimates indicated that power supplied from nuclear power stations would be about 50 per cent. dearer than that generated from the newer conventional coal-fired stations.

G.W.B. Electric Furnaces for United Steel Project

FOLLOWING the recent statement of the United Steel Companies, Limited, that it is to spend £10,000,000 installing what will be the largest electric steelmaking plant in the world at its Steel, Peech & Tozer branch at Rotherham, G.W.B. Furnaces, Limited, Dudley (Worcs), announces that it is to supply the first two giant electric arc furnaces for the project. They will be almost twice as large as any previously built in Britain and their electrical demand will be equivalent to that of a town the size of Huddersfield, each furnace having an electrical rating of 40,000 kVA.

The furnaces will be of Demag design, although, apart from the regulator, the equivalent of which is unobtainable in this country, the units will be entirely of British manufacture, the steel construction being carried out by the Distington Engineering Company, Limited, a United Steel subsidiary. Each furnace shell will have an internal diameter of 24 ft., a nominal capacity of 150 tons, and will be capable of melting at the rate of 1 ton per minute. In practice the furnaces will be used for a maximum of 110 tons ingot weight.

To overcome uneven lining wear, one of the serious shortcomings of the modern high-powered arc furnace, they will embody a patented feature of De Roll, Switzerland.

The first G.W.B. arc furnace will come into operation in 1963.

British-built Nuclear Research Reactor in Denmark

DENMARK'S Atomic Energy Commission has confirmed that its nuclear research reactor, which was supplied by Head Wrightson Processes, Limited, a subsidiary of Head Wrightson & Company, Limited, Thornaby-on-Tees (Yorks), came into operation on Sunday. The tests carried out on the reactor, which is situated at the Atomic Research Centre, near Copenhagen, have proved entirely satisfactory and the project was completed on schedule.

Head Wrightson has been awarded contracts for six 10mW enriched uranium heavy water-moderated research reactors (three in the UK, one in Australia, one in West Germany, and one in Denmark). They will enable essential research to be conducted on the testing of materials under the effects of irradiation.

Recent Wills

MELLOR J. F., of Whaley Bridge (Derbyshire), coal merchant and farmer	£12,890
BOLTON, CHRISTOPHER, of Neenton, near Bridgnorth (Salop), retired coal merchant	£8,580
REINHARDT, H. G., former chairman and managing director of Turner Machinery, Limited, Leeds	£20,779
FORD, R. G., late a director of G. R. Turner, Limited, railway wagon builders, etc., of Langley Mill (Notts)	£32,791
BOCLER, HARRY, formerly chief naval architect at Swan, Hunter, & Wigham Richardson, Limited, Wallsend	£33,042
SELL, M. A., late managing director of the Alnwick Construction & Engineering Company, Limited, Alnwick (Northumberland)	£47,968
INTESTATE	
JACKSON, JOHN, a director of Matterson, Limited, manufacturers of cranes, machine tools, etc., of Rochdale	£7,548

STEEL PENDULUM

Output's Upward Swing Continues

ESTIMATING steel output for 1960, the Iron and Steel Board sets the sights at 24,000,000 tons. Output in 1959 totalled 20,200,000 tons, but current production is at the rate of 23,500,000 tons. Additional capacity will be put into operation this year, bringing total capacity up to about 25,500,000 tons and this figure could be more nearly approached than the estimate of 24,000,000 tons as raw material supplies are expected to be available for a larger production if required.

Over the year the production pendulum swung in a broad arc from being 15.4 per cent. below the comparative 1958 figure in the first quarter to 29.6 per cent. above in the fourth quarter. Steelmaking capacity showed a similar swing. In the first quarter the percentage worked was 75.6, compared with 92.9 in the first quarter of 1958. By the fourth quarter the positions were almost exactly reversed—93.4 per cent. compared with 75.1 per cent. For the year as a whole the weekly average production rate improved by 5.2 per cent. The percentage worked, at 83.8 per cent., was 1.2 per cent. better.

The pendulum has not swung so far for pig-iron production, which started the year off by being 17.3 per cent. below the 1958 figure and ended by being 18.6 per cent. up, the improvement failing to reach parity with the 1958 performance by 1.2 per cent. At the beginning of 1958 there was an average of 95 furnaces in blast and the number fell to 74 recorded for the third quarter of 1959. Average output per furnace has risen from 37,000 tons at the beginning of 1958 to 46,000 tons at the end of last year.

Changing Pattern of Steel Deliveries

Total finished steel deliveries in October and November, 1959, recovered to almost the same level as in the peak period which occurred in the same two months of 1957. Compared with that period, however, considerable changes have taken place. Deliveries to railways and rolling stock have dropped over the past two years by 57.9 per cent., shipbuilding and marine engineering by 37.1 per cent., and coal mining by 34.4 per cent.

Increases are less pronounced, but more widespread. Deliveries to motors, cycles, and aircraft have gone up by 18.8 per cent., dropforgings and laminated springs by 12.1 per cent., and both hollow-ware and metal furniture, windows, springs, etc., by over 9 per cent. Deliveries to stockholding merchants (including material subsequently exported by merchants) have risen by 15.5 per cent. and exports by producers by 11.9 per cent.

During the third quarter of last year the UK share of international trade in steel products rose sharply to 16.1 per cent., higher than at any time since the end of 1957, when it stood at 15.7 per cent. It dropped to 12.4 per cent. in the third quarter of 1958. The US share has fluctuated over the same period from 28.2 per cent. to 11.2 per cent. in the second quarter of last year and 6.4 per cent. in the third quarter. Japan reached her maximum in the fourth quarter of 1958, when she took 9.4 per cent. of the trade. It has now levelled off to about 8 per cent. The six ECSC countries accounted for 57.6 per cent. in the first quarter of 1957 and this, except for two slight setbacks, has risen steadily to almost 70 per cent. for the third quarter of 1959.

The total amount exported by the nine major exporting countries (including the ECSC but excluding trade between its members) in the third quarter was somewhat lower than in the same period of 1958, but at that time trade was stimulated by the opening of the Chinese market which proved to be only a temporary feature. The share of the ECSC countries and Japan remained unchanged between the third quarter of 1958 and 1959, but the share of the US was almost halved following the prolonged steel strike.

In the case of semi-finished steel and plate, sections, sheet, and tinplate the UK share was higher in the third quarter of last year than in the same period of 1958, although the increase in sheet was not so marked. The proportion of tinplate (43.6 per cent.) was unusually high and was assisted by an increase in sales to the ECSC and to Latin America. There was a very sharp contraction in the world market for rails and railway material between the third quarters of 1958 and 1959.

Reconnaissance Survey for Uranium

RECONNAISSANCE survey for uranium, carried out by the Atomic Energy Division of the Geological Survey in the last two years, is now virtually complete. Although 70 new occurrences of uranium have been found, no deposit of economic importance has been discovered and it is concluded that if any are present they are covered to such a depth with soil or overburden that they are unlikely to be detected by existing instruments.

The south-west of England uranium province has served for many years as an ideal testing ground for British geological electronic equipment, which is now used extensively throughout the world, and recent work has contributed considerably to the development of aeroradiometric surveying techniques.

TWO PROMINENT French steel firms are to merge. Cie. des Forges et Acieries de la Marine et de St. Etienne is to take over Acieries et Forges de Firminy and a new company—Cie. des Forges et Acieries de la Marine de Firminy et de St. Etienne—is to be formed. Firminy shareholders will receive one Marine share in exchange for each share held.

English Steel's Research Director

WHEN Dr. H. H. Burton retires on January 31 from the board of the English Steel Corporation, Limited, Sheffield, he will continue as research consultant to the group until the end of the year. Mr. T. R. Middleton, who has been appointed a director of the corporation, has also been appointed director of research with effect from February 1.

DR. H. H. BURTON

Mr. Middleton was appointed a special director and chief metallurgist of English Steel in July, 1950. He joined Cammell Laird & Company, Limited, Sheffield, in 1922, and after periods in the chemical laboratory and research department, became manager of the tool steel melting department and later assistant manager of the steel department at the Cyclops Works. When the English Steel Corporation was formed in 1929, he was appointed assistant manager of the electric melting department of the River Don Works, and subsequently became associated with a variety of production activities.

In 1935 Mr. Middleton was transferred to the research department and has since acted as a principal in all aspects of the corporation's metallurgical work. He is a Fellow of the Institution of Metallurgists and a member of various technical committees.

Dr. Burton joined the staff of the research department of Cammell Laird & Company in 1907, later becoming assistant superintendent of the department. After the formation of English Steel he was appointed senior assistant to the late Mr. J. H. S. Dickenson, whom he succeeded as chief metallurgist in 1934. He was appointed a special director in 1938. A vice-president of the Iron and Steel Institute and an associate member of the Ordnance Board, Dr. Burton is a member of the general board of the National Physical Laboratory. He was, for many years, a member of several joint committees of the Iron and Steel Institute and the Iron and Steel Industrial Research Council, becoming chairman of the Ingots Committee and other committees on the death of Dr. Swinden. Under the present British Iron and Steel Research Association organization, he is a member of the council and of the metallurgy divisional panel and chairman of the Alloy Steels Research Committee, the Forging Committee, and the Inclusions Committee.

During the last war Dr. Burton was appointed chairman of the Technical Sub-committee dealing with gun forgings and was also a member of the Gun Design Committee, the Metallurgy Committee of the Advisory Council on Scientific Research and Technical Development, the Technical Advisory Committee, and many others.

He was responsible for many investigations in connection with steels for aircraft, guns, and tank and aircraft armour. He was a member of the delegation to the United States in 1943 in connection with the conservation of alloys in steel manufacture. When the Inter-Services Metallurgical Research Council was formed after the end of the war, Dr. Burton was appointed a member of the council, and, also, the first chairman of the Ferrous Metals Committee, which is one of the main branches of the council's activities.

Dr. Burton took an active part in problems arising from the rearmament plan at the time of the Korean War and the steps which were taken to conserve scarce alloying elements. He was appointed chairman of the Alloy Steel (Rearmament) Technical Committee, which was formed in 1951, and also a member of the Metals Economy Committee of the Ministry of Supply.

He was made a CBE in 1952 and the honorary degree of Doctor of Metallurgy was conferred upon him by Sheffield University the following year. From 1956 to 1957 he was president of the Iron and Steel Institute. Dr. Burton is also a member of the Court of Governors and Advisory Committee on Engineering and Metallurgy of Sheffield University.

Metal Industries Steps Up Bid for Lancashire Dynamo

BID by Metal Industries, Limited, for the share capital of Lancashire Dynamo Holdings, Limited, has been raised. The new offer is 120 5 per cent. cumulative preference of £1 in MI for every £100 of Lancashire Dynamo 5½ per cent. cumulative preference stock, and for every £1 of Lancashire Dynamo ordinary stock, either one £1 MI share and 12s. in cash or half of £1 MI share and 45s. in cash.

On Monday, Metal Industries withdrew the terms of its offer made on Christmas Eve for Lancashire Dynamo Holdings.

In a circular to preference and ordinary stockholders at the weekend, the directors of Lancashire Dynamo Holdings said that a merger of the company with Electric & Musical Industries, Limited, would offer better prospects to stockholders who retained their interests in the amalgamated companies as a long-term investment than would a merger with Metal Industries. The directors said that the EMI offers were fair and substantially better than those made by Metal Industries. They accordingly recommended both preference and ordinary stockholders to accept the EMI offers and stated their intention of accepting that offer in respect of all the ordinary stock in which they are interested.

The Lancashire Dynamo board further stated that if the EMI offer becomes unconditional they intend to declare a further and final dividend of 7½ per cent. on the ordinary stock in respect of 1959, which would be retained by stockholders who accept the EMI offer.

Mr. Nabarro Turns to Steel

WHEN the House of Commons reassembles after the Christmas recess on Tuesday, the Chancellor of the Exchequer, Mr. D. Heathcoat Amory, will be asked three questions about 12 British steel companies which are still "nationalized."

The questions have been tabled by Mr. Gerald Nabarro, Conservative MP for Kidderminster, well known for the attention he gives to fuel and power matters in the House.

Although they refer to the financial standing of the companies, the questions are intended to draw a statement from the Chancellor on whether the companies will be denationalized.

INFUSION BLASTING IN SOLID COAL

Presidential Address to North Wales Branch, NACM

By RAYMOND WILLIAMS*

Results of combining high-pressure deep hole infusion and pulsed infusion shotfiring on to an armoured conveyor were described by Mr. Williams in his presidential address to the North Wales Branch of the National Association of Colliery Managers, on October 2, 1959. Improvements have been made in the percentage of large coal by the application of this technique, harmful airborne dust has been reduced, and safer conditions are obtained on the face.

IFTON COLLIERY is situated in the southern area of the North Wales Coalfield. The area is heavily faulted and the strata are generally inclined at an average of 1 in 3, dipping to the east.

The colliery has six production faces and a training face. Four of the large districts are fully mechanized with shearer loaders in three different seams. These mechanized faces produce some 1,400 ton/day and represent 80 per cent. of the output. The Two Yard seam section of the installation under consideration has a working section of 5 ft. 3 in. (Fig. 1), made up of a fireclay floor; 1 ft. 7 in. bottom coal; 6 in. dirt band; 2 ft. 6 in. top coal and 8 in. carbonaceous shale. The roof consists of 1 ft. of bind coal, overlain by a weak mudstone.

This high degree of coal-face mechanization in the last three years has increased production efficiency to an average of 86 cwt. saleable o.m.s. at the face, and 26.00 cwt. overall o.m.s. Mechanization has brought the inevitable increase in small coal. Production of large coal over 2-in. size represents 28 per cent. of the saleable output.

In an attempt to decrease the amount of smalls being produced, and at the same time maintain a high proportion of mechanization at the face, new methods are being tried. One which is proving encouraging is a combination of high-pressure pre-infusion of the seam with water, up to 20 ft. in advance of the face (to condition the coal for preparation and to prevent airborne dust), and pulsed infusion short-hole shotfiring, off the solid on to an armoured conveyor.

Historical Summary

The purpose of this paper is to give a short historical summary of how the system was developed at Ifton Colliery, a description of the layout, and the results obtained after three months of operation.

The Two Yard Seam presents a difficult dust problem with mechanization. Three years ago, one of the mechanized faces in the Two Yard seam, producing 250 ton/day, showed that the airborne dust was too high and could not be maintained within the approved standards. Sprays on the shearer loader and jets of water directed into the back of the cut were not satisfactory. Pre-infusion of the seam had to be undertaken to continue mechanized working of this face. Excessive water from the sprays was playing havoc with the fireclay floor, and causing excessive prop penetration, with subsequent bad roof conditions. Even waste-water from the hydraulic rams caused trouble. To infuse water into a dry seam to combat airborne dust would have had such an injurious effect on floor and roof in this seam as to certainly condemn mechanization.

However, the dust condition was severe enough to try infusion rather than revert to hand-filling. Infusion of the face was carried out utilizing an hydraulic ram pump; the seam was found to infuse 5-ft. holes between 600/800 lb./sq. in. The working section of the face was 6 ft. and the holes were located about 4 ft. from the bottom above the middle dirt band. There was no particular reason for the selection of this horizon for holes. The distances between the holes was 10 ft.

The effect of the infusion was surprising, not only because it solved the dust problem, but also, after the first shift, the pressure induced into the seam had the effect of conditioning the top coal. Top coal came down freely and was ploughed on the conveyor, with over 50 per cent. reduction in shotfiring.

Previously, 40 shots per strip, *i.e.*, 80 shots per shift were required to bring down 2 ft. 6 in. of top coal left up after the 40-in. dia. shearer drum had cut the length of the face. Maximum wetting of

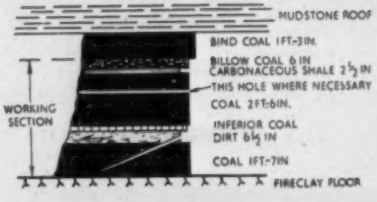

FIG. 1.—SECTION OF THE TWO YARD SEAM SHOWING POSITION OF SHOTHOLES.

* Manager, Ifton Colliery, No. 5 (North Wales) Area, North-Western Division, NCB.

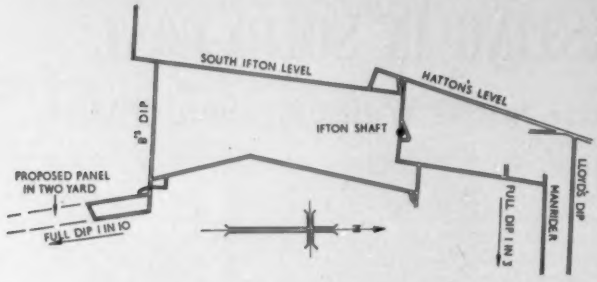

FIG. 2.—LOCATION OF THE 35-YD. DEVELOPMENT FACE IN THE TWO YARD SEAM.

the seam was achieved without detriment to the floor or roof. This infusion took additional labour and two men had to be included in the face personnel.

Having had such reasonable results with infusion, an application was made to HM Inspectorate of Mines in September, 1957, for exemption from Regulations 28 and 44 of the Mines and Quarries (Explosives) Regulations, so that pulsed-infusion shotfiring could be carried out in the stable holes on this face. This was carried out successfully, and the manpower saved from cutting was utilized on the infusion of the face, thus reverting back to the original face personnel.

With the experience gained from these early trials, eight stable holes on four mechanized faces are now prepared by firing from the solid, using the pulsed infusion technique, averaging a 4 ft. 6 in. pull at an average of 600 lb./sq. in. pressure to achieve infusion.

A short 35-yd. face in the Two Yard seam was opened out in May, 1958, as a pilot face to develop two 120-yd. panels of coal to the south (Fig. 2). This face was fully reserved for training, but it was essential that it moved over rapidly so that the development of the south panels could keep to schedule.

Due to the short length of the pilot face, it was not practical to instal expensive mechanical loading equipment and switchgear, and in light of experience with pulsed-infusion firing of stable holes, it was decided to prepare the face by the pulsed-infusion method, firing direct on to an armoured conveyor jacked against the face.

Previous tests on coal loaded separately from stable holes in the Two Yard seam had shown that only approximately 20 per cent. of coal over a 2-in. screen could be expected when firing off the solid in this manner. Despite the large percentage of small coal produced, this short face was not primarily for producing coal, but mainly for development, speed of advance being the deciding factor.

The Area delegate on the Divisional Dust Prevention Advisory Committee, Mr. R. Mullen, Group Manager, had reported favourably on the deep-hole infusion trials carried out at Parsonage Colliery in the North-Western Division, and it was decided to try this technique with power loading instead of the daily infusing.

A high-pressure pump was earmarked for use on the mechanized unit. From reports of the trials carried out at Parsonage Colliery, infusion was only required once per week instead of every working shift. However, we were not anxious to introduce new methods and additional equipment in a district producing satisfactorily, and after consultation with HM Inspectorate of Mines who required further information on the behaviour and results of deep-hole infusion in other seams and coalfields, it was agreed to carry out trials on the training development face. Should it be a success there, it would be extended to other production units.

Having in mind the effect normal infusion had on coal preparation, it was considered that if pressures in the order of 3,000 lb./sq. in., which the pump was capable of, could be induced into the seam irrespective of depth, the coal would be in a condition to assist in preparation and coal would be larger on firing.

Face Supports

The training face is supported by rigid steel H-section 3½-in. by 3½-in. props and 7-ft. corrugated steel bars, with total caving of the wastes between the 6-yd. roadside packs; the waste edge being supported by hardwood chocks, with the quick release incorporated (Fig. 3).

The cycle starts with the panzer conveyor hard against the face. The front row of props are set 2 ft. 6 in. from the face with the leading end of the corrugated bar flush against the face, so that 2 ft. 6 in. overhangs from the front row of props. The coal is fired direct on to the conveyor and as the coal is cleared, 7-ft. bars are erected with the back row of props adjacent to the former front row and the face supports set at the face. The conveyor is now completely covered with a row of supports and bars at 4-ft. intervals, 6 ft. between the edge of supports under each bar.

After the 4-ft. 6-in. strip of coal is cleared, the panzer must be advanced likewise. The conveyor is jacked across to the front row of supports against the face, the front row of props is removed and re-set 2 ft. 6 in. back from the face, thus completing the cycle.

This system is obviously not a prop-free-front and complies with all the requirements of the M & Q Act (Support) Regulations, no exemption being necessary. The rigid steel props are shortly to be changed for hydraulic or friction props and the hardwood chocks for hydraulic ones, thus making for a more efficient support system, easier to handle.

Face Equipment

The face conveyor is the BJ-D C.20 armoured flexible conveyor with a single 45-h.p. drive through

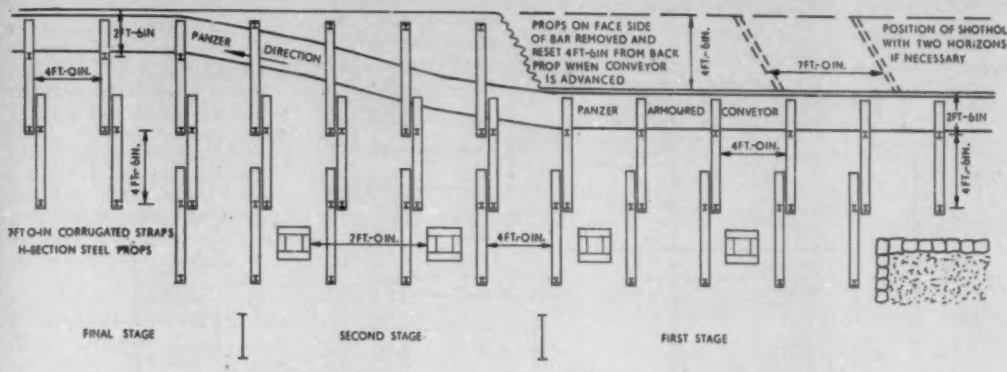

FIG. 3.—SUPPORT PLAN OF THE 35-YD. TRAINING FACE IN THE TWO YARD SEAM.

a Vulcan Sinclair fluid coupling. The face conveyor is advanced with hydraulic rams powered by a Gullick 5-h.p. triple-ram pump, situated in the main gate. This pump is not now required as the infusion pump can be utilized for all duties.

The infusion equipment, high- and low-pressure guns, pressure and flow meters, valves and high pressure hose and fittings, all tested up to 4,000 lb./sq. in., are supplied by H. Lindley, Limited, Bradford. Infusion guns are of the expanding rubber-seal type, depending on the pump pressure to seal the hole. The deep-hole infusion gun is placed to within 1 ft. of the back of the hole and inserted by feeding the braided high-pressure hose up the hole to the back and withdrawing about 12 in.

The most important equipment which makes the whole technique possible is the high-pressure water infusion pump which is designed and patented by Tangyes, Limited, Birmingham. The pump is called the "Hydraflo" (Fig. 4). It is compact and simple to operate, constituting an entirely new approach to high-pressure pump design. Oil hydraulic power is used to reciprocate a double-acting single piston instead of conventional gearing, crankshaft and connecting rods. The pump is operated by a 25-h.p., 1,450-r.p.m. induction motor, which is direct coupled. The pump is designed to operate on two ranges and is capable of delivering 900 gal./hr. up to 1,500 lb./sq. in. and 450 gal./hr. at 3,000 lb./sq. in., *i.e.*, 15 gal./min. at 1,500 lb./sq. in., or 7½ gal./min. at 3,000 lb./sq. in. The pump is fully protected from overload and overheating.

When the unit is set for high pressure, *i.e.*, slow speed, the circuit is so arranged that the ratio between the effective thrust area of the oil piston to the effective pumping area of the water piston is approximately 2.5:1. This ratio obviously remains constant whatever load is imposed on the pump at the selected speed; *e.g.*, at full load—3,000 lb./sq. in. water pressure—the oil pressure is approximately:

$$\frac{3{,}000}{2.5} = 1{,}200 \text{ lb./sq. in.}$$

From the circuit diagram (Fig. 5) it can be seen that the annulus area of the oil cylinder is less than the thrust area of the piston; the actual ratio is 1:2. However, constant thrust load and speed is achieved by arranging the oil pressure from the transmission pump to be fed constantly to the annulus. It can be understood, therefore, that equal thrust in either direction is achieved by merely exposing the main piston area alternately to the pressure and exhaust. It may appear that the speed of reciprocation would differ in either direction due to the difference in areas between the annulus and main piston. Constant speed, however, results since the annulus feeds oil to the main piston while the annulus volume is diminishing, thus supplementing the supply of oil from the transmission pump.

The water displacement cylinder and piston proportions A and B, are similarly arranged so as to achieve constant delivery pressure and flow. On the suction stroke, which occurs only every half cycle, water is drawn into the cylinder A at twice the rate the pump normally delivers. This is because the full piston area is effective on the suction stroke only. Also during the suction stroke, water is delivered from the annulus B at the rated output.

FIG. 4.—HYDRAFLO WATER INFUSION PUMP.

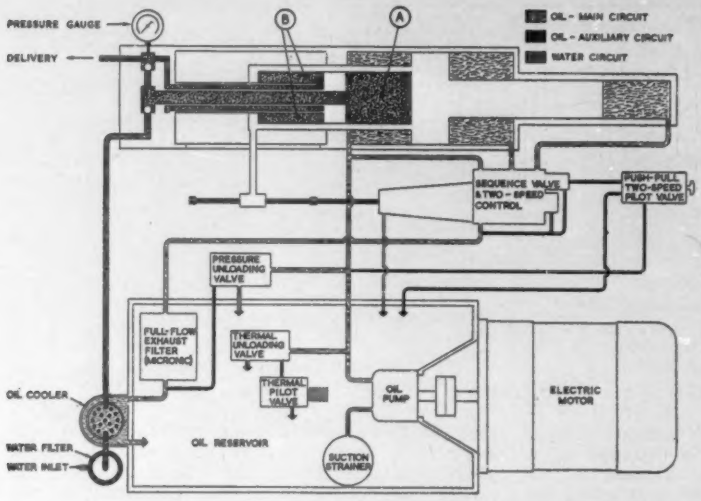

FIG. 5.—CIRCUIT DIAGRAM OF THE HYDRAFLO PUMP.

When reciprocating in the other direction the full piston area is discharging water from the cylinder, half the quantity is delivered at the rated output, the other half filling the annulus side of the cylinder B ready for the next stroke.

The effective area of the water displacing cylinder remains constant whatever speed the pump is set for, consequently the output is proportional to the pump speed. When the unit is set for low pressure, *i.e.*, fast speed, the circuit is re-arranged by introducing the two-speed piston to oppose the thrust of the main piston annulus or, by connecting it to exhaust and reducing the main piston area, dependent on the direction of motion. Twice the speed of the reciprocation is achieved under these conditions, since the two-speed pistons halves the area of the annulus or effective area of the oil main piston. This alters the ratio of the effective areas of oil to water pistons to approximately 1.25:1. This ratio again remains constant whatever load is imposed on the pump at the selected speed, *e.g.*, at full load—1,500 lb./sq. in. water pressure—the oil pressure is approximately:

$$\frac{1,500}{1.25} = 1,200 \text{ lb./sq. in.}$$

It can be seen that the oil pressure is the same at full load whether running on high or low pressure, thus maintaining constant input horse power.

Pump Pressure

Pump pressure is determined only by the resistance of the circuit into which the pump is delivering. In the case of coal infusion this resistance is made up of several components, namely, pressure drop in the pipe lines due to friction, pressure drop across the infusion guns (necessary in most designs to create initial sealing), and the resistance of the coal face. Obviously the first two items should be kept to a minimum, where choice permits, in order to have the maximum pressure available for actual infusion.

For a given resistance, the pressure created will vary in accordance with the flow, consequently, when the pump is running fast and delivering more water the pressure created will be greater than when the pump is running slow against the same resistance.

This explains why the pressure drops when changing over from low to high pressure and *vice versa*. As a guide to the correct choice of speed, the pump should be always started on high pressure, and if the resulting pressure due to the total resistance of the circuit is below 600 lb./sq. in. it will then be possible to change to low pressure (fast speed), without overloading the pump. The resulting pressure will be then approximately 1,500 lb./sq. in. owing to delivering twice the quantity against the same resistance.

Experience and Results

The 35-yd. face commenced infusion firing during the second week in May. From observations taken during three weeks, 1,005 shots were fired on the face in 15 shifts, averaging some 67 shots per shift on coal preparation. The average face advance was 22 ft./week.

The shotholes were bored at an angle of 60 deg. to a depth of 5 ft. in two horizons: one row in the top coal above the dirt band and the other in the bottom coal. The holes had to be located 3 ft. apart, fired singly, average charge 14 oz. in 12- and 16-oz. cartridges, average infusion pressure was 650 lb./sq. in.

The coal prepared well as can be seen from Fig. 6. With stable hole preparation, small coal was being produced, and, unfortunately, no actual screening tests were carried out during the period. However, previous tests on the product from the Two Yard seam prepared in the same manner indicated that 80 per cent. of the coal passed through a 2-in. mesh.

This prepared coal was in every respect similar in appearance, and without a doubt, looked disappointingly small. About a quarter of the coal prepared was blown on to the panzer conveyor and was transported from the face without touching it again. On Monday, June 22, 1959, deep-hole infusion trials were carried out for the first time. Table 1 shows some of the details and results over 11 weeks of trials with deep-hole infusion.

Two holes, 20 ft. long, located 10 yd. from the rib sides, were drilled in the top coal. Some 442 gal. of water were infused when water began to pour from the edge of a 3-ft. fault which was at the

TABLE 1.—*Summary of Results Taken During an 11-week Trial Period.*

Position of hole. T = Top B = Bottom	Infusion pressure, lb./sq. in.	Quantity infused, gal.	Flowmeter readings, gal.	Rate of flow, gal./min.	Time taken, sec.
			69.6		
T	500	0.5	70.1	2.0	15
T	600	1.1	71.2	2.2	30
T	500	1.4	72.6	2.8	30
B	700	1.1	73.7	1.32	50
B	650	1.1	74.8	0.95	70
B	480	0.9	75.7	3.6	15
T	600	1.2	82.8	4.8	15
T	750	2.8	85.6	2.8	60
B	600	1.0	86.6	6.0	10
B	580	0.9	87.5	2.7	20
T	580	1.6	89.1	4.8	20
B	650	1.1	90.2	3.3	20
T	680	0.9	91.1	2.7	20
T	600	3.1	101.6	3.1	60
T	600	0.6	102.2	1.2	30
T	600	3.6	105.8	3.1	70
T	580	0.8	109.9	3.2	15
B	570	2.4	112.3	4.8	30
T	610	1.1	113.4	2.64	25
T	560	1.5	114.9	3.0	30
B	760	0.6	119.4	0.6	60
T	770	0.3	120.3	0.3	60
T	750	2.2	124.0	2.1	60
B	750	2.1	126.2	2.2	60
T	730	2.0	128.2	2.0	60
T	730	1.2	130.5	1.44	50
B	750	1.5	132.0	1.5	60
T	750	0.5	132.5	2.0	15
B	750	1.0	133.5	2.0	30
T	600	1.4	134.9	2.1	40

rib side of the main gate. The initial pressure developed, while simultaneously infusing these two holes, was in excess of 3,300 lb./sq. in., and so overloaded the pump. The automatic overloading valve was constantly tripping the pump and finally the pump switchgear.

The by-pass valve, for withdrawing the infusion gun and allowing water to leak at the infusion hole, was used to limit the pressure to 2,500 lb./sq. in. and the pump operated satisfactorily. The face was worked for a week and advanced 22 ft. When boring at the end of the week, the borings were damp for 10 ft., showing that for a 20-ft. hole. the penetration was in the order of 30 ft.

A 22-ft. 6-in. deep hole enabled more water to be infused. A shorter hole of 15 ft. enabled only 440 gal. of water to be infused, and an 18-ft. hole gave an average of nearly 700 gal. for three holes and a penetration of 26 ft., which was over one week's advance.

Deep-hole infusion is reasonably easy to carry out and approximately 2 gal. of water per cubic yard of seam is adequate. The optimum length of hole appeared to be 18 ft., and it was decided to maintain holes at this depth.

Boring is done with normal coal drills, with 3-ft. extensible drill rods. The time taken for the whole job with one skilled man and a trainee is less than 3 hr.: Boring, 52 min.; assembling and dismantling equipment, 38 min.; and infusion, 90 min.; giving a total of 180 min. Two weeks prior to the deep hole infusion and three weeks after, surveys were carried out to determine what the effect would be on airborne dust. Table 2 shows the results in detail.

TABLE 2.—*Airborne Dust Surveys.*

Surveys carried out during two weeks prior to deep-hole infusion shotfiring preparation of the seam.

Date.	No. of samples taken.	Average particles per c.c.
1.6.59	11	263
2.6.59	12	286
3.6.59	12	306
4.6.59	12	705
5.6.59	12	363
8.6.59	12	362
9.6.59	12	397
10.6.59	12	363
11.6.59	1 over 6 hours	415
12.6.59	1 over 6 hours	478

Survey carried out during three separate weeks after deep-hole infusion combined with infusion firing.

Date.	No. of samples taken.	Average particles per c.c.
16.7.59	1 over 6 hours	359
17.7.59	"	363
20.7.59	"	210
21.7.59	"	160
22.7.59	"	452
23.7.59	"	138
7.9.59	"	439
8.9.59	"	282
10.9.59	"	399
11.9.59	"	377
12.9.59	"	315

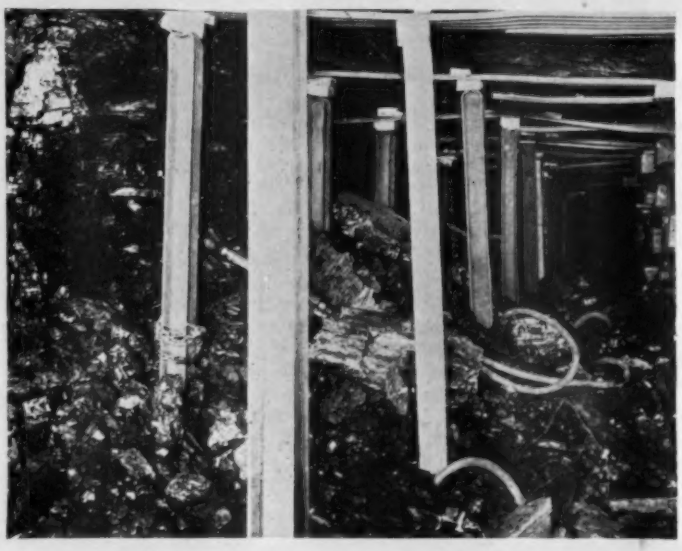

FIG. 6.—LARGE COAL PRODUCED BY PULSED-INFUSION SHOTFIRING. THE CHAIN FASTENED TO THE POST (*left*) IS USED TO SECURE THE SHOTHOLE INFUSION GUN.

The ventilation contained an average of 387 particles per c.c. between 1-5 microns in size, when on short-hole infusion, and 316 particles per c.c. with a combination of the deep-hole infusion and short-hole infusion blasting—a decrease of 18 per cent. in the amount of airborne dust. An average of 558 particles per c.c. is normal for the Two Yard seam prepared by conventional methods with a minimum of 300 and a maximum of 1,088.

Short-hole Infusion Shotfiring after Deep-hole Pre-stressing

Observations on daily meter readings and the time taken for each hole to be infused (until water seeped freely from the face or adjacent holes), yielded some interesting results after deep-hole infusion. Table 3 shows a detailed survey of a typical shift on preparation of the face by infusion firing.

TABLE 3.—*Detailed Survey During a Typical Preparation Shift Using Infusion Firing.*

Pressure range, lb./sq. in.	Number of top holes.	Number of bottom holes.	Total quantity of water infused (gal.).	Time (sec.).	Average rate of flow, gal./min.
475–525	3	—	3.7	115	1.94
525–575	1	—	1.5	30	3.0
575–625	12	—	18.2	415	2.64
625–725	3	—	3.3	50	3.95
725–775	9	—	13.4	400	2.02
475–525	—	4	5.9	115	3.08
525–575	—	2	3.5	75	2.80
575–625	—	7	10.9	250	2.62
625–675	—	5	4.4	127	2.08
675–725	—	2	2.7	110	1.47
725–775	—	6	7.4	315	1.41

The infusion pressure is the pressure developed by the pump to achieve flow through the coal. For every hole it remains constant throughout infusion, except for the time taken to build up pressure which is a matter of a few seconds after starting the hole. Graphs of the two horizons show a distinct difference in trend for top and bottom holes. In the bottom holes, the rate of flow falls off as the pressure needed to infuse builds up; obviously a natural expectation.

According to hydraulic engineers, the flow of water through various shaped nozzles obeys the general relationship of:

$$P = a\,V^{2.4}$$

Where: P = pressure; V = rate of flow; a = a constant depending on type of nozzle (in this case, being the type of coal, fissures, etc.).

Thus a graph of flow and pressure would be expected to represent a rectangular hyperbole, and in the bottom horizon of holes it in fact, does. The graph of the top horizon, however, bears no relationship, and it is suggested that the significant difference proves the effect of the deep-hole infusion in inducing breaks in the coal, thus weakening it, and assisting shotfiring in solid coal.

The dirt band separating the top and bottom coal is more resistant to water flow than the coal. This is borne out by moisture samples taken of both coal and dirt band before and after infusion as follows: normal free moisture in seam, 4.0 per cent; coal specific gravity 1.36 (*a*) before infusion, 7.1 per cent., (*b*) after infusion 11.0 per cent., dirt band, specific gravity 2.36 (*a*) before infusion 4.3 per cent., (*b*) after infusion, 7.1 per cent.

The free moisture before infusion due to moisture *in situ* from the effects of previous infusion, shows an increase of 3.9 per cent. for the coal, but only 2.8 per cent. for the dirt. Consequently, since the deep holes are only bored in the top coal, the bottom coal is much less affected by the infusion due to the presence of the dirt band. By the time the water pressure reaches the bottom coal, it will be falling off. This is also verified by observations on the face and reports that little water seeps out of the bottom coal during infusion. Thus, the top coal is more likely to be broken up than the bottom coal and will have many more induced breaks.

The higher rate of flow in the top holes clearly shows there is no regular resistance to the flow of water, *i.e.*, there is a change in the constant (*a*) due to the already broken coal through high-pressure deep-hole infusion. Hence, the graph of pressure against the rate of flow shows no reasonable relationship to the rectangular hyperbole. The bottom holes being less affected by the deep-hole infusion, offers a higher and more regular resistance to the flow of water on the short hole infusion.

The author suggests there is need for more research. The constant (*a*) can be classified for all seams and conditions thereby producing a table of pressures for depth of penetration and volume of water required. The effect of deep-hole infusion is also evident in shotfiring. There is 15 per cent. decrease in the amount of shotfiring necessary, the face now requiring an average of 57 holes as compared to 67 during the three weeks' trial prior to pre-infusion.

The prepared coal looked a much better product on site and subsequent detailed grading and sizing tests shown in Tables 4 and 5 indicate a significant improvement.

Personnel and Face Organization

It must be borne in mind that this experimental face is fully reserved for training, and therefore, is more highly staffed than would be normal on a

TABLE 4.—*Size Tests of Three Methods of Working in Same Seam.*

Grade.	Orthodox working.	Mechanized.	Combined deep and short-hole infusion.
	Per cent.	Per cent.	Per cent.
Large + 3 in.	28.6	21.0	17.6
Washed cobbles, 2 in. by 3 in. ..	8.3	5.0	10.4
Washed doubles, 1¼ in. by 2 in. ..	9.6	8.1	7.8
Washed singles, ¾ in. by 1¼ in. ..	11.4	10.2	16.4
Washed smalls, below ¾ in. ..	42.1	55.7	47.8
Discard	20.4	23.1	21.2
Coal + 2 in.	36.9	26.0	28.0
Reasonable market doubles and singles	21.0	18.3	24.2

TABLE 5.—*Effect of Improved Sizing using the Pulsed Infusion/Pre-stressed Method Compared with Mechanized Mining.*

Grade.	Mechanized method.			Pulsed infusion/pre-stressed method.		
	Current price.	Percentage output.	Proceeds.	Current price.	Percentage output.	Proceeds.
	s. d.		d.	s. d.		d.
Large, over 3 in.	96 9	21.0	2,031.75	96 9	17.6	1,702.80
Cobbles, 2 in. by 3 in.	95 3	5.0	476.25	95 3	10.4	990.60
Doubles, 1½ in. by 2 in. ..	88 2	8.1	714.10	88 2	7.8	687.65
Singles, ⅝ in. by 1¼ in. ..	94 7	10.2	964.72	94 7	16.4	1,551.11
Slack, under ⅝ in.	81 7	55.2	4,544.00	81 7	47.8	3,899.11

NOTE.—The average selling price using mechanized mining is 87s. 3.7d./ton, compared with 88s. 3.8d./ton when the pulsed-infusion/pre-stressed technique was used.

production face. The agreements reached with the NUM representatives at Ifton Colliery for tasks to be allocated on fully reserved training faces are as follow :

First 20 days of training, supervisor and trainee to carry out 1½ the duties expected of two trained men ; second 20 days of training, supervisor and trainee to carry out 1½ the duties expected of two trained men ; final 20 days of training, supervisor and trainee to carry out 1½ the duties expected of two trained men.

The supervising and trainee borers work with the shotfirers on the preparation shift. At the first shift of the week the long-hole boring and infusion is completed in about 3 hr., and the remainder of the face pulsed infusion fired in 4 hr. The supervisors and trainees fill off the remainder of the coal not blown on to the conveyor and erect the face supports. After clearing the coal, they jack forward the conveyor, remove the face side prop, and reset another row of supports on the waste side of the conveyor.

Ripping, packing, waste-drawing and main-gate conveyor extending is done on the shift following coaling. The system, is, therefore, cyclic on this training face, but it need not be ; the system can lend itself to continuous mining.

Productivity

The average raised and weighed tonnage from the unit is 83 tons per day, or 67 tons saleable. The average face manshifts inclusive of overtime during an 11-week period, were : Colliers, eight ; borers, two ; ripping, 6½ ; packs and wastes, 6½ ; conveyor extension, two ; shotfirer, one ; giving a total of 26 manshifts. Thus the raised and weighed face o.m.s. is 63.9 cwt. and the saleable face o.m.s., 51.8 cwt.

These results compare favourably with hand-filled faces in the same seam, and having regard to the uneconomical length of face, and bearing in mind that this is a training face, where wages are not dependent on output, the results are very encouraging.

The 120-yd. flank face which this pilot face is developing to the south will be manned as a production unit, and the personnel will be fully trained men with a reasonable competitive contract. From results obtained on this unit, the manpower should be: Ripper, five; borers, two; colliers, 18; packs and wastes, 12; conveyor extenders, two; shotfirers, three; contingencies, one; giving a total of 43 men.

One strip of 4 ft. 6 in. on this 120-yd. face at 5 ft. 6 in. working section will produce 280 tons unscreened coal, or some 220 tons saleable. With a face manpower requirement of 43 men, assuming 5 per cent. overtime, a full production unit will show a productivity of 124 cwt. raised and weighed face o.m.s and 98 cwt. saleable face o.m.s. This is much higher than orthodox methods and compares with mechanization in the same seam at 130 cwt. raised and weighed and 100 cwt. saleable face o.m.s.

TABLE 6.—*Summary of Explosives Cost.*

	Orthodox machine cut, hand-filled.	Pulsed infusion/ pre-stressed method.
Lb. explosives per ton	0.29	0.59
Detonators per ton	0.42	0.83
Cost of explosive per ton ..	5.25d.	1s. 2.0d.
Cost of detonators per ton ..	2.50d.	7.0d.
Total explosives charge	7.75d.	1s. 9.0d.

Operational Costs

Explosive costs are higher, as would be expected, the details being shown in Table 6.

Current prices of explosives used were for " Infugel," 201d. per 100 lb., " submarine " detonators, 701d. per 1,000, compared with the normal eq.s. explosive, 162d. per 100 lb. and standard detonators, 441d. per 1,000

There is an appreciable increase in explosives used in this method. The cost of explosives and detonators is higher, and with double the amount of explosives being used, represents some 1s. 1.25d. per ton additional cost. This is far offset by the immediate saving of cutters' wages which is 1s. 3d. per ton at Ifton.

Combined supervisor and trainee wages cost per ton, inclusive of bonus and cost of living award are : Colliers, 6s. 11d. ; borers, 9d. ; wastework, 4s. 7d. ; rippers, 4s. ; other face work, 2s. ; giving a total face cost of 18s. 6d. per ton. Average face wages cost on a conventional face at Ifton is 20s. per ton. Training on conventional face work during the year 1958 cost on an average 27s. 6d. per ton in the same seam.

With trained men on a 120-yd. production unit, the wages cost should be in the order of 45 per cent. less, the productivity increasing as estimated by over 90 per cent., *i.e.*, from 51.8 cwt. saleable, achieved on training face, to 98 cwt. saleable, easily achievable on production units under the same circumstances.

Conclusions and Comments

It must be concluded that from results obtained over the past three months, the obvious benefit of the technique is the high productivity potential for small capital outlay and operating costs. Similar results can be obtained to that of a fully mechanized face with a higher percentage of large coal.

The system of infusion shotfiring and deep-hole infusion eliminates expensive and dangerous coal-cutting machinery in confined spaces; vulnerable electrical trailing cables and switchgear are dispensed with, and shotfiring made safer. Possible ignition of firedamp in the undercut is eliminated, and airborne dust is held down to an absolute minimum.

It is intended in the near future to introduce simultaneous firing of six holes during the filling shift to take advantage of the moving conveyor. By fitting a ramp on the front of the conveyor, it can be hydraulically jacked into the prepared coal, thus loading most of the seam without hand-filling.

While the Tangye pump is capable of high-pressure infusion as it was designed for, there is need for a dual-purpose pump, with a variable speed motor or other control, so that all the duties can be performed with one pump.

It is noted in the new draft Mines and Quarries Explosives Regulations, 1959, that the Minister inserts new regulations to allow infusion shotfiring, and removes various existing requirements that are inappropriate to this new method of shotfiring. It is also noted, with regret, that the provisions of Regulation 44, whereby the coal must be sheared to the depth of the shothole are still retained, thus the new regulation with reference to infusion firing means very little. Exemptions from the provisions of Section 44 must still be obtained from HM Inspectorate before infusion firing can be generally applied.

Acknowledgments

The author would like to thank Mr. G. Nicholls, Area general manager, No. 5 (North Wales) Area, National Coal Board, for permission to present this paper as a presidential address, and is indebted to Mr. L. L. Edwards, HM Senior District Inspector of Mines, and Mr. R. Mullen, group manager, for consultation and the benefit of their experience on deep-hole infusion in the North-Western Division.

Thanks are extended to Tangyes, Limited, for permission to publish technical details of their equipment.

Acknowledgment is also made for the help received from Mr. P. Smith, DPT mining student, for his very detailed surveys and reports.

AN 83-PAGED booklet has recently been published by the Institution of Production Engineers, London, W.1, called "Improved Material Utilization," price 12s. 6d. The report includes articles dealing with finishes and finishing materials; packaging and shipping materials; ceramics, metal powders and plastics; and ancillary processing materials.

Hydraulic Ram with Independent Control Valve

AN improved hydraulic ram for face conveyors (Fig. 1) developed by Richard Sutcliffe, Limited, Horbury, Wakefield, is claimed to offer a number of important advantages.

The ram cylinder is made from solid drawn tube, the bore being smooth honed to size—a method which prolongs the life of the piston packings and seals. The piston rod is ground to size and electrolytically coated with hard chrome to increase the wear life of the rod and packings and to provide protection against corrosion.

FIG. 1.—IMPROVED HYDRAULIC RAM FOR FACE CONVEYORS.

Synthetic fabric reinforced seals together with the polished rods and honed tubes, eliminate leakages, making it unnecessary to fit a high-rate delivery pump.

The control valve is independent of the ram and is mounted on the adjacent waste-side plate. Cast in high-grade iron, the valve body is fitted with a polished hardened-steel rotary piston on plug-cock principles. The seals are drained and there are no plastic plates to wear. The valve has three positions: ram-out, neutral, and ram-in. In neutral, the ram can be disconnected without loss of oil, leaving the system undisturbed.

West Midlands Coal Sales Officers

MR. W. DULSON is regional sales officer (general industry) in the Marketing Department of the West Midlands Divisional Coal Board. Mr. F. W. Swift is assistant regional sales officer (general industry).

The above supplements the information given in the West Midlands Division personnel list, published in the December 4, 1959, issue of IRON AND COAL (p. 1019).

THE annual meeting of the British Association for the Advancement of Science, will be held at Cardiff from August 31 to September 7.

"Iron and Coal" is Seeking a

METALLURGICAL EDITOR

Details regarding the appointment can be obtained by writing to:

The Commercial Director,
IRON AND COAL TRADES REVIEW,
17/19, John Adam Street,
London, W.C.2.

Vallak Hop-tops

THE "Vallak" hot-top for use in reducing pipe and segregation in steel ingots during pouring is a simple device, made in the form of a rectangular cake consisting of coke breeze, sawdust, and a binder.

Other convenient and suitable materials may be employed for the same purpose. The cakes are coated on the inside face and lower edge with a thin refractory lining to prevent carbon pick-up by the steel, from the hot-top materials. During casting, the combustible constituents of the walls become ignited and burn with air drawn from the atmosphere. This tends to maintain even if it does not actually increase the temperature of the steel within the hot-top.

A new factory to make "Vallak" hot-tops is being built at Holbrook Estate, Halfway, near Sheffield, and is expected to be opened this month. Meanwhile inquiries regarding manufacture in Great Britain are being handled by Vallak (GB), Limited, Blackpool Old Road, High Furlong, Blackpool, Lancs.

Sample Screening

A NEW type of sample screening machine is now being marketed by Birtley Engineering, Limited. The design has been introduced to meet the need for a compact, high capacity unit for the grading of bulk samples in preparation rooms and laboratories. A single screening surface is employed, incorporating four screen plates of the sizing required, through which the graded product passes to detachable and transportable containers positioned under the machine.

As with all screens, the capacity varies with the material and its condition. Tests have indicated that with 20 per cent. coal of 0-$\frac{3}{16}$ in.; 35 per cent. $\frac{3}{16}$ in.-$\frac{1}{2}$ in.; 30 per cent. $\frac{1}{2}$ in.-1 in.; and 15 per cent. 1 in.-2 in.; and with the smallest screen plate having $\frac{1}{4}$-in. square holes, the screen will handle about 15 cwt./hr. when the moisture content is about 10 per cent. If the bulk of the material to be sized is less than $\frac{1}{4}$ in., with considerable moisture, the throughput will be low.

Properties and Applications of SG Iron

Produced recently by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1, is a further publication in the series dealing with the development of SG iron. The new publication, which is fully illustrated, describes in detail the properties of SG iron, listing a number of important applications. The section on properties includes tables and information on strength, toughness and ductility, elasticity, fatigue resistance, hardness, wear-resistance, thermal properties and corrosion-resistance.

Detachable Prop Base

A DETACHABLE prop base which reduces the amount of floor penetration by rigid steel props under load was designed by Mr. A. A. Bowker when he was general manager of No. 3 Area, East Midlands Division, National Coal Board. It has been used with success at several collieries in that Area.

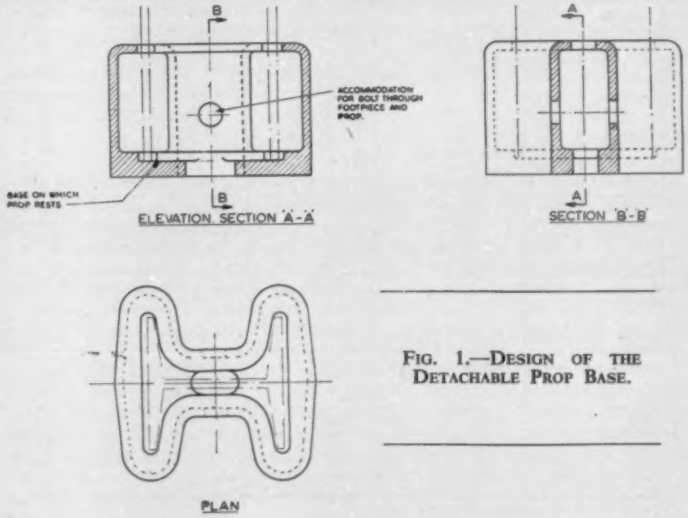

FIG. 1.—DESIGN OF THE DETACHABLE PROP BASE.

The device operates on the principle that resistance to floor penetration depends not only on the cross-section of the prop bearing on the floor, but also on the perimeter of the base of the prop since there is also a vertical sheer resistance to penetration.

Increased Base Area

Fig. 1 shows how the design achieves a much larger length of perimeter at the base, and larger cross-sectional area, than the prop which it supports. The base consists of a mild steel shell, designed to receive the "foot" end of an H-section rigid steel prop. The size of the shell is variable, depending on the section of prop involved.

The prop rests on the base of the shell and is attached and retained in position by means of a bolt which passes through the shell and the web of the prop.

Pig-iron and Steel Production

STATISTICAL SUMMARY

THE following United Kingdom pig-iron and steel statistics are issued jointly by the Iron and Steel Board and the British Iron and Steel Federation. Table 1 gives the production of pig-iron and ferro-alloys and the number of furnaces in blast in November, Table 2, production of steel ingots and castings in November, and Table 3, deliveries of finished steel in October, 1959. Table 4 summarizes activities of the industry.

TABLE 1.—*Average Weekly Production of Pig-iron and Ferro-alloys in November*, 1959. (*Thousands of Tons.*)

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derbys., Leics., Notts., Northants, and Essex	18	1.4	22.1	21.4	0.7	—	45.6
Lancs. (excl. N.W. Coast), Denbigh, Flints., and Ches.	5	—	15.5	—	—	1.1	16.6
Yorks. (excl. N.E. Coast and Sheffield)							
Lincs.	8	—	41.9	—	—	—	41.9
North-East Coast	16	1.8	57.6	—	—	—	59.4
Scotland	6	0.2	18.0	0.6	—	—	18.8
Staffs., Shrops., Worcs., and Warwicks. ..	5	—	7.5	0.9	—	—	8.4
S. Wales and Monmouthshire	11	2.4	61.4	—	—	—	63.8
Sheffield	2	—	3.7	—	—	—	3.7
North-West Coast	7	17.1	0.6	0.4	—	1.0	19.1
Total ..	78	22.9	228.3	23.3	0.7	2.1	277.3
October, 1959 ..	76	22.0	220.0	23.9	1.1	2.8	269.8
November, 1958 ..	85	23.7	190.0	17.6	0.2	2.2	233.7

TABLE 3.—*Average Weekly Deliveries of New Non-alloy and Alloy Finished Steel* (*Thousands of Tons.*)

Product.	1957.	1958.	1958. Oct.*	1959. Sept.*	1959. Oct.
Non-alloy steel:					
Ingots, blooms, billets and slabs‡	5.0	4.6	3.2	5.7	4.9
Heavy rails ..	11.2	10.2	10.5	6.8	6.4
Sleepers	1.3	1.2	1.0	0.5	0.3
Fish and soleplates	0.8	0.7	0.7	0.4	0.5
Plates:					
(i) Over ⅜in.thick	34.0	29.6	26.7	26.6	29.3
(ii) Under ⅜ in.	20.3	17.7	16.8	19.0	20.3
Other heavy prod.	53.0	41.8	34.8	48.0	51.5
Ferro-concrete bars	8.9	7.6	6.9	12.9	11.7
Wire rod	23.3	21.5	24.3	24.7	27.9
Arches, etc. ..	11.0	8.6	7.9	7.8	7.6
Other light sections	38.7	29.1	29.1	36.9	39.5
Bright steel bars ..	7.0	6.2	6.2	8.3	9.1
Hot-rolled strip ..	23.1	22.6	23.6	30.1	31.3
Cold-rolled strip ..	7.1	7.0	7.1	9.2	9.7
Sheets, incl. coated					
(i) Hot-rolled ..	13.0	10.6	10.5	14.1	13.8
(ii) Cold-reduced	29.1	31.1	32.3	37.5	39.4
Tinplate:					
(i) Hot dipped..	11.3	8.4	9.6	8.8	7.2
(ii) Electrolytic	7.5	10.3	12.0	14.9	14.1
Blackplate ..	1.0	0.8	0.8	0.9	0.8
Tubes up to 16 in.	22.1	19.0	18.4	22.5	25.4
Tube fittings, etc.	0.5	0.4	0.4	0.4	0.5
Tyres, wheels, axles	5.1	4.5	4.2	1.8	2.0
Forgings (excl. drop)	3.1	2.6	2.3	2.0	2.2
Steel castings ..	4.6	4.2	3.8	3.7	3.8
Tool steel, etc. ..	0.3	0.2	0.2	0.2	0.5
Total	342.3	300.5	293.3	343.7	359.7
Alloy Steel	17.8	16.1	13.6	18.5	21.7
Total deliveries from UK production† ..	360.1	316.6	306.9	362.2	381.4
Add: Imported finished steel ..	9.6	7.1	3.5	6.1	7.8
	369.7	323.7	310.4	368.3	389.2
Deduct: Intra-industry conversion§ ..	48.2	41.2	42.3	51.7	54.4
Total new material ..	321.5	282.5	268.1	316.6	334.8

† Includes finished steel made from imported and semi-finished.
‡ Other than for conversion into any other form of steel listed.
§ Material for conversion into other products also listed.

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in November*, 1959. (*Thousands of Tons.*)

District.	Open-hearth. Acid.	Open-hearth. Basic.	Bessemer.	Electric.	All other.	Total. Ingots.	Total. Castings.	Total ingots and castings.
Derbys., Leics., Notts., Northants., Essex ..	—	4.9	15.2 (basic)	2.7	0.1	21.3	1.6	22.9
Lancs. (excl. N.W. Coast), Denbighs., Flints., Ches.	1.4	33.9	—	5.0	0.3	39.2	1.4	40.6
Yorks. (excl. N.E. Coast and Sheffield)								
Lincs.	—	48.9	—	—	0.1	48.9	0.1	49.0
North-East Coast	0.9	86.6	—	1.5	0.4	87.6	1.8	89.4
Scotland	1.4	46.1	—	2.9	—	48.5	1.9	50.4
Staffs., Shrops., Worcs., Warwicks	—	24.5	—	4.2	0.8	27.7	1.8	29.5
S. Wales and Monmouthshire	2.1	94.4	12.9 (basic)	0.9	0.1	110.0	0.4	110.4
Sheffield (incl small tonnage in Manchester) ..	8.2	37.8	—	14.0	0.3	58.4	1.9	60.3
North-West Coast	0.1	—	5.2 (acid)	0.8	—	6.0	0.1	6.1
Total	13.6	376.9	33.3	23.7	0.1	447.6	11.0	458.6
October, 1959	14.3	362.3	30.7	32.0	2.1	430.7	10.7	441.4
November, 1958	12.2	293.4	23.4	20.9	2.0	342.1	9.8	351.9

TABLE 4.—*Iron and Steel Index and General Summary of Pig-iron and Steel Production.* (*Weekly Average in Thousands of Tons.*)

Period.	B.o.T. Price Index, 1938 = 100. Iron and steel.	Coal.	Basic materials§	Iron-ore output.	Imported ore used.	Coke sent to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy). Imports.†	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.‡
1957	328	488	537	325	303	270	275	220	14	417	322	1,444
1958	343	403	478	276	262	227	245	196	9	369	284	1,542
1959—Sept. ..	338	486	485	288	259	212	251	231	7	426	318	1,467
Oct. ..	339	504	480	299	283	228	270	235	7	441	336	1,445
Nov. ..	339	504	483	299	291	234	277	247	9	459	—	1,410

* Months contain five weeks, all tables.
† Weekly average of calendar month.
‡ Stocks, mainly ingots and semi-finished steel, at the end of the years and months shown.
§ Used in non-food manufacturing industries.

Operational Research in the STEEL INDUSTRY

By R. H. COLLCUTT, B.Sc.(Eng.)

In this contribution to a conference on "Operational Research at Work" held in September, 1959, jointly by the British Institute of Management and the Operational Research Society, Mr. Collcutt, who is head of the Operational Research Department at the British Iron and Steel Research Association, discusses three typical examples of operational research investigations conducted for the steel industry.

OPERATIONAL research is concerned with a scientific enquiry into the problems of management in order to construct a description of the field of operations from which it is possible to derive reliable forecasts of the effects of policy; in principle no distinction need be made between policy as it affects the firm as a whole and as it affects an individual operation.

Such an approach to management problems is not new, but of recent years the development of mathematics and the techniques of research have advanced rapidly, making hitherto intractable problems amenable to solution. At the same time the ever increasing pace of industrial life consequent upon the technical advances of recent decades has led to a complexity over which even the most competent management would hesitate to claim complete mastery. It has been found that teams of scientifically trained personnel can sometimes augment the experience and expertise of management by devoting themselves to full time research into the ways in which industrial organizations operate.

The output from operational research groups should be a better understanding of operations in the form of reliable advice on the probable consequences of possible action; advice which will enable management to reduce the risk involved in decision making.

Operational Research Teams

As is now well known, the first use of operational research teams on any scale was in support of military operations during the war. In the steel industry a direct descendant of these wartime teams was the two-man group formed in the British Iron and Steel Research Association in 1946.

Today, there are operational research teams in almost all the major steel companies as well as at BISRA; in total there are about 200 people concerned with operational research studies in the industry which is a remarkable testimony to the value which management place on the activity. In addition, there are large groups concerned with more detailed work study, statistical, and organization and methods investigations; the dividing lines between these and operational research are sometimes difficult to draw, depending more on differences in training between the personnel concerned than on the problems they investigate.

It is not the intention of this paper to labour these differences but rather to concentrate on a description of three examples which will illustrate operational research at work in support of the industry as a whole; of an individual company management; and, finally, of departmental executives.

Problems of Iron-ore Imports

Some years ago the steel industry, in considering its future development plans, was intent on arriving at an integrated policy concerning the importing of foreign ore. The buying and importation of foreign ore was and still is the responsibility of a central agency acting on behalf of the whole industry, and the ore is resold to the individual companies as it comes over the ship's side at the receiving port. In order to facilitate decisions, BISRA was asked to investigate the problems involved in importing iron ore; the Operational Research Department was set the task of investigating the factors which affect the cost.

The cost of the ore to the companies can be considered as the sum of the price of the ore once it is in the holds of the ship at the foreign port, of the cost of shifting the ore, and of the cost of unloading it at the receiving port. The price of the ore loaded on a ship at the foreign port depends upon market values and many other factors, most of which the steel industry cannot directly control except by the normal processes of commercial bargaining and negotiating contracts in the open market. It was decided, therefore, to concentrate on the other two aspects of the cost, the transportation by ship and the unloading.

In considering this problem it is apparent that each ship used to transport ore can be considered to have the following work cycle: (i) Waiting and loading at the foreign port, taking an average time t_c; (ii) travelling from foreign port to home port and back, taking average time t_v each way; (iii) waiting outside the home port for a vacant berth, taking an average time t_w; and (iv) being unloaded

and revictualled, etc., at the home port, taking average time t_u.

The time T for each ship to work this complete cycle can be expressed by the equation:

$$T = t_e + 2t_v + t_w + t_u \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Since the time a ship waits and takes to load at the foreign port must be considered as outside the control of the British industry alone, it was, for the purposes of the study, considered to be a constant for a given size and type of ship. The value which this constant assumed in practice was ascertained from the records of ships' voyages.

The travelling time $2t_v$ was also considered to be a constant for a given size and type of ship travelling between two particular ports. This step had its justification in the fact that in general ships are always operated at what the owner considers to be the most economical speed. For the same reasons average voyage times for particular ships and between particular ports were also obtained by a study of the records of ships' voyages.

Ship Waiting Time

The time a ship may have to wait, or queue, for an empty berth at the unloading port (t_w) will depend upon how many other ships need to use the same berths, how many berths are equipped for unloading iron ore, and how fast a ship can be unloaded once it is at the berth.

The last part of equation (1), the time the ship is occupied with unloading (t_u), depends on the type and size of ship, the unloading facilities on the berth, and the type of ore which has to be unloaded. Obviously, the shorter the time (T) denoting the complete work cycle for each ship, the more voyages each ship can perform in a given time and the smaller the total number of ships of a given type and size necessary to import a given amount of ore with a corresponding saving in transport charges per ton. Such a reduction in the number of ships importing a given quantity of ore could be effected by reducing the average wait for a berth (t_w) and/or the time to unload the ship (t_u).

The necessity of waiting for a berth would, in theory, be avoided if ships' journeys could be scheduled so as to make a ship arrive just as the previous ship at the berth had finished unloading. In practice, variations in the time to unload a given ship, which depend, for example, upon the type and condition of the ore it carries, combined with storms and delays at sea and at the foreign port to upset pre-arranged schedules. Despite considerable scheduling of journeys there are thus inevitably times when two ships arrive at the same berth more or less together and one of them has to wait; there are other times when the interval between one arrival and the next is so long that the berth remains empty and the unloading equipment and its operators idle.

Such fluctuations in the demand on the port cannot be eliminated. On the other hand, a faster turnround of individual ships at the berth will reduce the average time ships have to wait for a berth, that is both t_w and t_u would be shorter. A speed-up in turnround at the berth cannot, of course, be achieved at no additional cost. Faster equipment costs more to buy and instal and may cost more to operate than slower equipment. Also, by clearing the berth more quickly, there will be more occasions when there is no ship queueing to occupy the berth and when equipment and labour are idle. The cost of installing faster equipment, moreover, may exceed any saving achieved by reducing the number of ships required by shortening the time they have to queue.

As there will always be some queueing no matter how fast the unloading equipment installed, the best position will have been achieved when the sum of the costs due to ships (including queueing, etc.) and the costs due to unloading are as small as possible, that is, at a minimum. To predict the achievement of this position it was necessary to discover in the first place how the speed of unloading at a berth affects the average time a ship must wait in the queue. Records of many ports and ships were examined to arrive at the time elapsing between successive arrivals of ships to be unloaded. A typical distribution of such time intervals for a particular port is shown in Fig. 1(A).

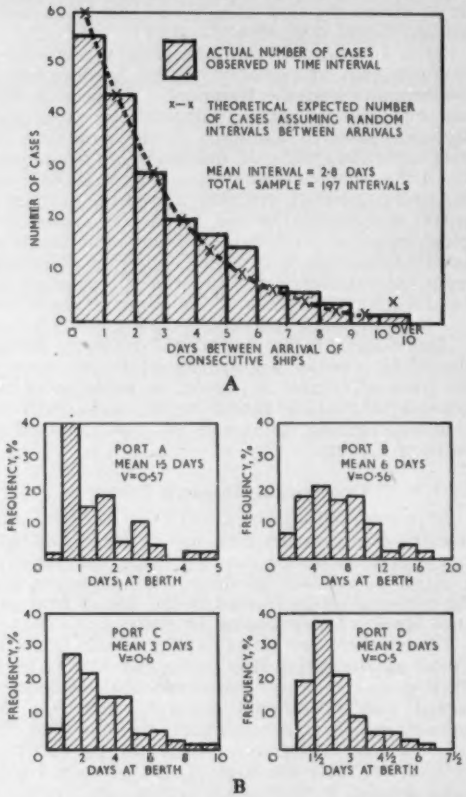

FIG. 1.—A—ARRIVALS OF SHIPS AT TYPICAL PORT. B—TIME TO TURN ROUND SHIP AT BERTH.

At this port data were obtained on 197 consecutive ship arrivals: the shaded histogram indicates that in 55 cases there was an interval of between 0 and 1 day, and in 44 cases an interval between 1 and 2 days and so on. The figure also shows (dotted line) the proportions of ship arrivals which would be expected if these arrivals were truly random. This theoretical distribution can be obtained from the following equation:

The proportion of intervals that are at least t days in length but less than $(t+1)$ days is:

$$e^{-\lambda t}(1-e^{-\lambda}) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

where λ is the mean rate of arrivals (0.36 ship/day).

It can be seen that the theoretical points obtained from equation (2) are a very reasonable approximation to the observed events. Similar correspondence between the theoretical and actual distributions was found at all ports. It will be seen later that this finding was an important and convenient one.

Data were also obtained from the port records on how long ships took to unload. For these figures to become meaningful they had to be classified according to ship size and type and examined in the light of the type of unloading equipment available at the berth. In Fig. 1(*b*) are examples of how the turn-round time of particular types of ship at the berth varied at each of four different ports.

The average time a ship was at the berth can be seen to vary considerably from one port to another due to the different unloading facilities available; the equally considerable variations within each port are due to such things as crane breakdowns, and different types and conditions of ore. Nevertheless, one important consistency exists between the various ports: the variation compared with the mean, expressed by the coefficient of variation, is for practical purposes the same in each case.

Relating Unloading Times

Findings from the above data were now used to establish the relationship existing between unloading times and the average time a ship would have to wait for a berth. Here, a theory originally developed by the Danish Telephone Service was used; their problem was to decide what was the relationship between the length of time a telephone user would have to wait for the exchange to answer and the facilities available at the telephone exchange for answering his call. The mathematics of the theory rest on the assumption that the time interval between any two calls from subscribers is random and that the mean and the coefficient of variation of the distribution of times which the operator takes to deal with calls are known.

The theory is equally applicable to the transportation-unloading system for ore ships. For the intervals between telephone calls substitute the intervals between ship arrivals; for the time the operator takes to deal with individual calls, substitute the turn-round time of the ship at a berth. The data, too, are in the right form to fit the theory. The observed distribution of arrivals of ships at a port approximates closely to a random distribution as has been shown and is illustrated by Fig. 1(*a*); the mean time to unload a ship can be calculated from a knowledge of the capabilities of the unloading equipment and the size of ship; the coefficient of variation is known to be a constant substantially independent of the mean as is demonstrated in Fig. 1(B). The average delay per ship (t_w) can thus be calculated from the following equation (assuming that there is only one berth suitable for unloading iron ore in the port):

$$t_w = \frac{\lambda t^2 \ (1 - v^2)}{2(1 - \lambda t_u)} \quad \ldots\ldots\ldots\ldots\ldots \quad (3)$$

where, as before,

λ is the mean rate of arrivals

t_u is the average time a ship is at the unloading berth

and v is the coefficient of variations of the times at the berth.

If there is more than one berth at the port a more complicated expression has to be employed.

With these mathematics and a knowledge of the capabilities of unloading equipment, the size of ships and the average arrival rate of these ships at a port, it was clearly possible to make a fairly accurate forecast of the average time each ship will be delayed in the queue waiting for a berth. This knowledge collated with values of the cost of ships when at sea and when in port, and the cost of unloading equipment capable of particular unloading rates, made it possible to build up a picture of the probable cost of the whole operation.

The results for a port expected to handle 1,000,000 tons of ore per annum, brought in ships of 8,000 tons capacity, are shown in Fig. 2. The total cost per ton of ore unloaded when various rates of unloading are provided at the berth is here divided into its component parts of cost of ship delays in the queue, cost of ship's time while at the berth, and cost of providing and operating the unloading equipment. It was found during the investigation that although the latter varied with the rate of discharge of which it was capable, it

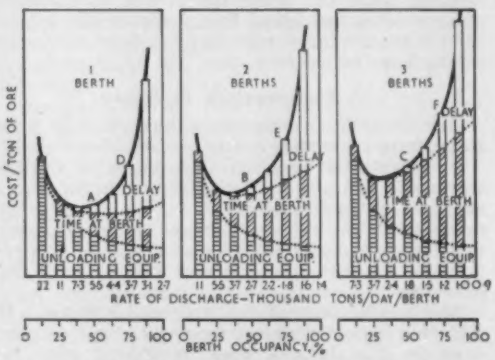

FIG. 2.—TOTAL COST OF DISCHARGE.

was sensibly independent of the various types of equipment available.

It can be seen from Fig. 2 that it is cheapest to provide only one berth with a high capacity unloading plant at a port handling this amount of ore rather than two or three berths with slower equipment. Also it is interesting to note that the cheapest situation arises when the berth is designed to be occupied for only half its time on average. The latter is important as it is contrary to the ingrained habit of the port operator who intuitively aims for the highest possible utilization of his equipment.

Fig. 2 summarizes the results of the operational research study. In practice, the ship is owned and operated by one man and the port by another. The question arises how to persuade both to operate in a manner which does not necessarily appear as the most efficient way of running their own business to either of them, but which is nevertheless the optimum way of operating the whole system. The link between the two was finally achieved by management paying a bonus for quick turn-round of ships which made it worthwhile to instal the right amount of equipment for operating the whole system in the most economical way. The introduction of this bonus made the situation optimal from the port operator's isolated point of view as well as synonymous with the situation which optimized the whole system.

The project is typical of operational research in that it looks at the whole system to discover the interdependencies, attempts to design a description of the system (in this case a mathematical model), tests its adequacy with actual operating figures, and uses it to forecast the effects of any changes in facilities and operating procedure. The study also shows how scientific techniques derived for one set of circumstances can be vicariously applied to an apparently quite different problem.

It will be appreciated that there are numerous operating problems in the steel industry which involve queues of one kind or another, for example, the reception sidings at a steelworks, all stocks of raw materials, of inter-process materials, and of finished products, the size of the engineering maintenance force and many others. A considerable volume of mathematical theory specifically applicable to these various problems has been developed in the last few years.

A Forgemaster's Problem

The company concerned in this example were forgemasters operating a number of hammer shops. The Operational Research Department of BISRA was asked to investigate whether a specified press shop, as yet unbuilt, would be more profitable than one of the existing hammer shops, assuming that the pattern of production (the relative proportions of different products) and load of work did not alter.

The capital cost of the proposed scheme was such that only if the press shop was able to do the work in five shifts a week, compared with the hammer shop's 15, would the savings (in labour costs, mainly) be sufficient to make the new forge profitable. The likelihood of the press shop achieving this rate of production therefore became the centre of the study.

Organization of the new press shop was planned to give a press utilization higher than the utilization of the existing hammer, which was found to be actively forging for only 35 per cent. of the working shift. Also, it was expected that the new press would actually forge faster than the hammer. The joint effect of these two factors would have to be at least a threefold increase in production per shift in order to make the change to the press shop pay.

The press would be served by two manipulators, one of which could charge the furnaces and collect the next job while the other was working at the press. Only when the manipulators changed roles at the end of a forging operation would pressing be interrupted. The number and duration of such changeovers and the actual rate of forging had to be estimated in order to arrive at an estimate of the production per shift.

The estimate of forging rates had to be obtained in a roundabout way, since no press of the proposed type had ever been used for the range of work undertaken by the company's hammer. However, it was possible to study a press and manipulator system similar to that proposed; this study lasted for three days, during which time only one type of product was made, but this was such that the advantages of this type of press could be fully exploited.

To obtain estimated rates of production for other types of product it was necessary to refer to published figures relating to Russian presses, there being no comparable data for forges in this country. These showed that production during the three-day study was at a rate below that for the same type of work on a 1,500-ton Russian press. It was therefore assumed that the press studied would not forge faster than the 1,500-ton Russian press on the other type of work included in the range undertaken in the hammer shop and that the rates of production at the 1,500-ton Russian press could thus be taken as an upper limit of what could be expected of the new press. These were then compared with rates of production in the existing hammer shop.

It was assumed that the Russian rates related to continuous working, interrupted only for change of jobs on the anvil, and the hammer rates were calculated on the same basis. The comparison is shown in Table 1.

TABLE 1.—*Production Rates of Russian Press and Company's Hammer*

Type of production.	Production rate (ton/hr.).		Press rate/ Hammer rate
	Hammer.	Press.	
A	2.20	2.71	1.23
B	1.55	1.66	1.07
C	0.58	0.47	0.81
D	0.77	1.55	2.00
E	0.93	0.47	0.50
F	—	—	1.0 to 3.0

Product F was not shown for the Russian press. A separate estimate showed that for this work press production would be 1.0 to 3.0 times that of the hammer, according to the type of steel.

The proportion of hammer time spent on each type of production was obtained from works records. The effect on total production time if the same work were forged at the press was then calculated as shown in Table 2.

TABLE 2.—*Effect of Press Forging Rate on Production Time.*

Type of production.	(i) Press forging rate/ Hammer forging rate	(ii) Hammer time on this production.	Time at press (ii) — (i)
A	1.23	22.8	18.6
B	1.07	12.0	11.3
C	0.81	9.8	12.0
D	2.00	8.1	4.0
E	0.50	8.0	16.0
F	1.0 to 3.0	10.8	10.8 to 3.6
	Total	71.5	72.7 to 65.5

From this table it can be seen that where the hammer needed 71.5 time units the press would need between 65.5 and 72.7 units. It was therefore estimated that the press was, on average, 1.0 to 1.1 times as fast as the hammer for this pattern of work.

The effect of the different forging rates on press utilization was next calculated to find out how a typical shift would be made up of forging, transporting and so on. Many jobs required more than one heat when forged at the hammer. With the faster press forging rates for some types of work, it would be possible to increase the amount of forging per heat, and hence to reduce the number of heats required. It was found that many of the jobs requiring three or four heats were those where the press was expected to be twice as fast. All such jobs could therefore be completed in two heats.

The work during 17 shifts was studied, and it was found that instead of needing 228 heats as at the hammer, the 138 jobs would be completed in 171 heats at the press. The handling time to and from the hammer was 1.041 min., while at the press it would be the time required for 171 changes of manipulator. It was estimated that the time per changeover would be not less than one minute nor more than two minutes, *i.e.*, handling time would be between 171 and 342 min. at the press.

These 17 shifts were used to estimate the joint effect of the changes in forging and handling times. The productive time during these shifts was spent

TABLE 3.—*Effect of Changed Forging and Handling Times on Make-up of Production Time.*

Activity.	Time in hammer shop. (min.)	Time in press shop.	
		(*a*)	(*b*)
Forging	2,781	2,649	2,649
Handling	1,041	171	342
Measuring	186	186	186
Tool preparation ..	136	—	—

NOTE: (*a*) Assumes 1-min./changeover.
(*b*) Assumes 2-min./changeover.

forging, handling work to and from the hammer, measuring the work for cutting or shaping, etc., and preparing handling tools. In the press shop handling tools would not be needed, but measuring would be unchanged. Also, as estimated above, handling time would be between 171 and 342 min., while forging would be 1.0 to 1.1 times as fast, say, 1.05 times as fast. The effect of these changes in the use of productive time is shown in Table 3.

It was estimated that in the press shop productive time would be divided between forging, handling and measuring in the ratios 2,649:171:186 or 2,649:342:186 according to the time required to change manipulators.

The amount of productive time available per shift was estimated by considering the disposition of time during hammer shifts, and by obtaining the management's opinion on what would be changed. The result of this was an estimated productive time of 360 min. and a non-productive time of 100 min./shift, through rest periods, bad timekeeping, etc.

The 360 min. were divided in the ratios given above, to produce the shift times shown in Table 4 for the two limiting manipulator changeover times. The press utilization was, therefore,

TABLE 4.—*Make-up of Average Press Shift.*

Activity.	Time per shift.			
	1-minute changeover.		2-minute changeover.	
	(Min.)	(Per cent.)	(Min.)	(Per cent.)
Forging	316	69	300	65
Handling	21	4	39	9
Measuring	23	5	21	4
Idle	100	22	100	22
Total	460	100	460	100

estimated as likely to be between 65 per cent. and 69 per cent., compared with hammer utilization of 35 per cent. Also the press forging rate would be 1.0 to 1.1 times the hammer rate. Production per shift in the press shop would therefore be between

$$1.0 \times \frac{65}{35} \text{ and } 1.1 \times \frac{69}{35}$$

i.e., between 1.8 and 2.1 times the hammer shop production. This is well below the rate of 3.0 required to make the press more profitable than the hammer.

Possible changes that would make the press shop more profitable were then considered. These were: (*a*) A change in the pattern of production; and (*b*) an increase in the press forging rate.

From Table 1 it can be seen that for some types of work the press is much faster than the hammer, while for other types it is slower. If the hammer work of types C and E were replaced by work in the other groups for the change to press working, then press production per shift would be between 2.6 and 2.8 times the hammer production. The press shop would then roughly break even on one-shift working.

The "similarity" of the press and manipulators

specified for the new shop and the press and manipulator that were time-studied consisted of a similarity of theoretical stroke cycle times as well as similarity in design. The cycle times were calculated from the manufacturers' specification of press and manipulator performance. In making these calculations it was found that, as specified, the relatively lagging performance of the manipulator would prevent the press from operating at its designed speed. The extent of this delay is illustrated by Table 5.

TABLE 5.—*Press Stroke Cycle Times with and without Manipulator.*

Bite size	2 in.	2 in.	4 in.
Penetration	½ in.	1 in.	1 in.
Stroke cycle time, press only (sec.) ..	1.04	1.33	1.33
Stroke cycle time, press + manipulator (sec.)	1.40	1.46	1.60

These differences, based on specifications only, were similar for both presses. In practice additional delays were discovered, caused by human reaction times, and by the fact that the manipulator cannot accelerate at its designed rate due to slipping between the drive wheels and the forge floor. The sum of these effects was that the observed stroke cycle times were double the design times. If stroke cycle times could be pulled into line with design times the press could be made to pay.

It was also shown that if the press shop worked two shifts taking over part of the work of a second hammer shop (there were several in the works concerned), the changeover to a press could be made profitable; and similarly, if the press were operated for three shifts a day, taking over work from a number of other hammer shops. At the same time there would be a drop in the number of men required, three press teams replacing up to nine hammer teams.

The techniques of analysis employed in this example are clearly elementary; but this only commends them to operational research workers, not least because it makes results easier to communicate to managements at all levels. The impression conveyed by the literature that sophisticated and complicated mathematics is invariably required is thus shown to be misleading.

Furnace Repair Problems

A large proportion of the steel produced in this country is made in large open-hearth furnaces. Both the roof bricks and the chequer bricks suffer considerable wear under operating conditions and have to be replaced from time to time.

A general repair of a furnace which can make 200 tons of steel at a time may require about 150,000 bricks and cost about £12,000; it may take as much as 15 days to complete repair operations, involving a loss of steelmaking capacity which constitutes a further cost of about £12,000. A modern steelmaking shop may contain as many as eight of these furnaces, at least seven of which are intended to be making steel at any one time. If two of these furnaces require repair at the same time either one furnace must wait, at a considerable loss in steelmaking capacity, or labour and equipment must be made available to carry out two repairs simultaneously which may at a subsequent time be seriously under-utilized, but which, nevertheless, has to be paid for. Mechanical aids brought in to speed up repairs will reduce the chance of two repairs clashing and increase the steelmaking capacity of the shop, but will also increase the operating costs.

The time allowed to elapse between repairs can be standardized and a fixed programme of repairs planned in advance. Such a procedure is, however, complicated by the fact that there is extreme variability in the periods over which any two furnaces will perform satisfactorily. A repair becomes essential when—if steelmaking were continued uninterrupted—the roof would collapse, with the attendant dislocation and monetary loss; to decide when a furnace dare not be worked for a further period without a repair is part of the steelmaker's art. A fixed programme of repairs will, therefore, only have a reasonable chance of success if the time fixed between repairs is considerably less than would be achieved on average if all furnaces were allowed to continue until roof collapse was imminent.

Scheduling and organization of repairs faces the shop manager with a very complicated decision. In practice, different shops have developed different solutions; yet few managers are entirely free from doubts as to the correctness of their particular one.

Though this whole problem is under review by an operational research team there is only space to outline the initial stage of the investigation. This was concerned with assessing the various systems for scheduling repairs in use and with developing a method of evaluating the merits of each system and of calculating, at a later stage, the effects of reducing the repair times by the different methods used.

It was decided to concentrate on the melting shop of one particular company and information was extracted from its records which included: (*a*) The dates when the furnaces went into and out of production, *i.e.*, fuel-on to fuel-off; (*b*) the type of repair carried out each time; (*c*) the occasions when furnace roofs had actually fallen in; and (*d*) the occasions when a furnace had been taken off for repairs before strictly necessary.

Comparison of Furnace-repair Systems

In an attempt to gain a general view of the kinds of scheduling system used in the industry, visits were made to a number of other works where repair practice was expected to differ markedly: three typical systems were selected for closer investigation: (*a*) *Laissez-faire* system in which the furnaces are only repaired when they become too dangerous for further production; (*b*) forecasting system in which periodic estimates of the remaining furnace lives are made and used to determine whether two or more repairs are liable to clash, if all the furnaces are left in production. In order to try to avoid such a predicted clash

a repair is brought forward; and (c) scheduling, in which furnaces are repaired as soon as possible once they have reached a given fixed campaign length.

By taking a range of values of each of the various factors which affect furnace availability, the number of repairs, etc., these three systems could be made to cover all those found in practice and any desired degree of accuracy of forecasts or rigidity of scheduling could be imposed.

Two possible methods, mathematical analysis and a simulation technique were considered for assessing the various scheduling systems for their effects on furnace availability, the number of repairs required and associated factors. No mathematical analysis having been found which could deal with the complexities of the problem without drastic simplifying assumptions resulting in greatly reduced accuracy, attention was focused on the use of a simulation technique.* This consists of a detailed record of all the appropriate operations of a shop, event by event, over a period of time. The frequency of events and their duration are obtained for this record by making random selections from past actual operations; this allows the fluctuations which would be experienced in practice to be built into the simulation.

* This technique is known as the Monte Carlo method.

A different set of operating rules, *e.g.*, a change from a *laissez-faire* to a scheduling system, would require a separate simulation, and the results from each can then be compared.

An electronic digital computer completed each simulation which had to cover at least 20 years of operation to provide a reliable result in half an hour, while by paper and pencil it would have taken about a fortnight. The computer programme was made as flexible as possible so that investigations into the effect of a large number of factors could be carried out quickly and trials made with data from other companies without involving major programme alterations. A series of 15 runs was made, each simulating 20 years in the particular melting shop considered and covering a range of the pertinent factors of each system. Most of the runs were made using the repair times achieved by the company studied, but two were made using shorter and one using longer than average repair times.

From a study of Figs. 3 and 4, and the detailed results for each run, it was seen that :

(1) For a given repair time, the *laissez-faire* system required the smallest number of repairs in a given period of time, also achieving the smallest availability it obtains with a forecasting system ; but this also involves a larger number of repairs. The strict scheduling system appears to lie between these two extremes (Fig. 3); availability using the

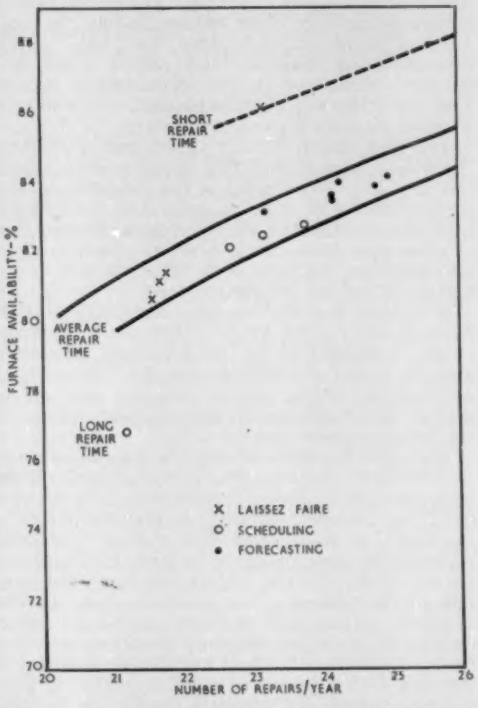

FIG. 3.—FURNACE AVAILABILITY AND NUMBER OF REPAIRS PER YEAR.

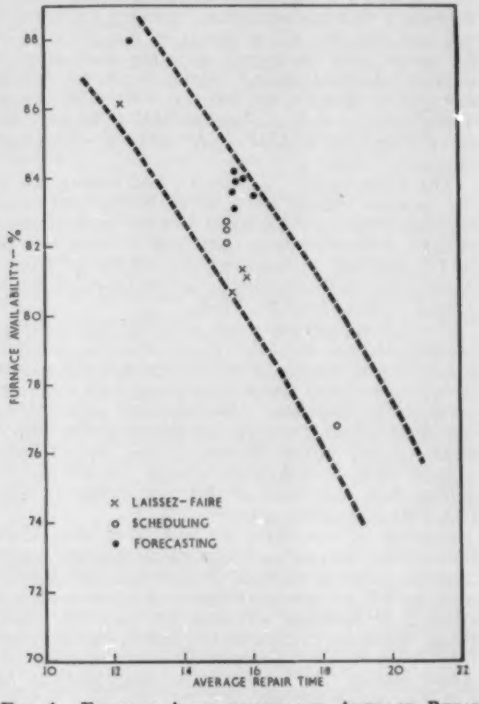

FIG. 4.—FURNACE AVAILABILITY AND AVERAGE REPAIR TIME.

strict scheduling scheme is probably not as high as with the forecasting scheme, but further trials are necessary to verify this.

(2) Varying the average repair time greatly affects furnace availability (Fig. 4). Insufficient runs were made to give an accurate result but it appeared that, if an appreciable reduction in average repair time could be achieved, greater dividends in increases in furnace availability would be possible than by altering the method of scheduling the actual repair programme.

These results are not enough to provide a solution to the problem of how to schedule repairs; they are only part of the answer which will be affected by the cost of reducing the time to do the repairs and many other factors, some of which were mentioned earlier. Work on these aspects is at present being undertaken.

It is believed that the three examples outlined above are typical of the many operational research studies currently being undertaken in the steel industry. They make it clear that operational research need not be confined to the production sphere. Indeed, the greatest dividend is likely to accrue from studies designed to assist in deciding overall company or industry policy. It is also clear that although advanced mathematics may be used in operational research, it is often unnecessary. In fact the major task of operational research in practice is to define the problem, select feasible alternative solutions, and decide upon a suitable criterion for choosing between them; the techniques of analysis are often secondary considerations. Finally, it can be said, without doubt, that operational research is at work in the steel industry.

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ULTRA-HIGH-TENSILE STEEL

Recent Ford Research Development

RESEARCH conducted by Ford Motor Company, Dearborn, Michigan (US), has shown that by extremely heavy mechanical working at between 420 and 560 deg. C., followed by transforming to martensite and tempering, an alloy steel of good ductility can be produced having an ultimate tensile strength of between 400,000 and 500,000 lb./sq. in. The steel is, in fact, a modified SAE 4340 described as a high hardenable steel with a metastable austenitic "bay."

The trade mark "Ausform" has been given to the process which aims to heat-treat and form simultaneously, producing shapes and parts of great strength. The method employed is described by E. D. Marande, manager of the metallurgy department, scientific laboratory, in an article published in "Steel" (September 21, 1959).

For a long period many metallurgists believed 350,000 lb./sq. in. (156 tons) was the ultimate practical strength for alloys. A fine-grained austenite was considered essential to give good properties, particularly toughness. Investigation was concentrated on austenite, while appreciating the importance of martensite fineness. This development suggests that metallurgists should concentrate on getting finer structures at the transformation temperatures of various alloys.

Starting by modifying an SAE 4340 steel, there is more time for mechanical work on the steel before austenite turns to bainite. Rolled in a mill, a minimum of 93 per cent. reduction of cross section is effected at between 420 and 560 deg. C. That range, however, is difficult to control, the temperature rising rapidly during severe reduction passes. After rolling, the material is quenched in oil followed by tempering.

In the same article Dr. Victor F. Zackay, supervisor of physical metallurgy, explains why the alloy responds to this new treatment. A number of alloy compositions were tried before finding the right area. Chrome additions open the "bay" on the transformation diagram, and permit wider temperature variations in the deformation process. Essentially the rest of the composition is similar to proprietary ultra-high-strength steels.

The high silicon content is retained in Ausform steels to improve tempering characteristics around 470 deg. C. A surprise is the ductility at low-temperatures. In fact, ductility and strength are highest with little or no tempering, both decreasing as tempering temperature increases. Results so far also bear out the superiority of martensite to any bainite or pearlite microstructures.

It appears that cold-working the austenite is the main reason for the exceptionally small grain size of the martensite in the Ford samples, this being about half that of untreated samples. The mechanical working breaks up the austenite into smaller grains, introduces micro-stresses, and bends the crystal structure.

These are five reasons why the resulting martensite is finer: Deformation increases grain boundaries and the number of places martensite platelets can form; the micro-stresses introduced promote the formation of more, and thus smaller, martensite platelets; the bending of the austenitic lattice limits growth of the platelets; and so does heavy deformation of the austenitic slip bands; and finally, the austenitic grains are stretched out, which further reduces cross section, blocking growth of the martensite. The Ford method includes a tempering to obtain a greatly improved yield strength. In some instances, yield and ultimate tensile are identical and well over 400,000 lb./sq. in.

The Yorkshire Coalfield

Technical Advances in 1959

FULLY operating collieries in the Yorkshire coalfield at the beginning of 1959 numbered 108, the North-Eastern Divisional Coal Board reports. Norwood Green Colliery (Area No. 7) ceased production on April 17. The divisional saleable output in 1959 was 41,917,420 tons, a decrease of 453,207 tons compared with 1958. In 1959 there was no Saturday working, while in 1958 there was Saturday working for the first four months. This accounts for a decrease of 772,537 tons. Due to an improvement in the normal five-day week output 319,330 tons of this loss has been recovered.

The total manpower at the beginning of 1959 was 135,444. This decreased by 7,882 during the year. Face manpower, however, only decreased by 3,129. Output per manshift increased during 1959: at the coal face by 3.4 cwt. to 83.1 cwt. and for all workers by 1.4 cwt. to 29.6 cwt.

Some notable technical advances were made during 1959. The use of strata bolts has continued, and last year 100,000 were installed in the division, compared with 80,000 in 1958. In the near future trials will begin using powered supports operated by remote control. At the beginning of 1959 four faces were equipped with powered supports and a further five were equipped during the year.

Powered Supports

Powered supports were used with a coal plough for the first time. Adverse geological conditions caused its withdrawal and the experiment ceased after six months, but useful lessons were learned and it is proposed to make a further trial during 1960. There are plans to equip 12 further faces with powered supports in the current year.

In 1959, 28.05 per cent. of the division's output was power-loaded, an increase of over 3 per cent. compared with 1958. Efficiency of power-loading has improved. The average coal-face output per manshift (pithead) for all units in 1959 was in excess of 6¼ tons, compared with 5.9 tons for 1958, an increase of 0.6 tons per manshift. There has also been a definite improvement in the daily total output obtained from power-loaded installations. During 1960 power-loading will continue to increase, with the emphasis on the use of machines that will produce a good proportion of large coal. It is hoped to instal 21 trepanners, 15 slicers, and seven ploughs during the year.

New mechanical cleaning plants were put into operation during 1959 at Steetley, Silverwood, and Middleton Broom collieries. At Thorne, as part of the major reconstruction which is in hand, the coal preparation plant has been completed.

Plants are under construction which will introduce mechanical cleaning of larger sizes than at present at the following pits:—Grimethorpe, where run-of-mine coal will be treated and graded and hand-cleaning entirely eliminated; Thurcroft, where the plant will clean mechanically and grade all coal up to 6 in.; Cortonwood, where the plant will mechanically clean and grade all coal up to 10 in.; and Fryston, where the plant will mechanically clean and grade coal between ¼ in. and 8 in.

Schemes are well advanced to instal plants which will incorporate practically 100 per cent. mechanical cleaning and grading at Manton, Brookhouse, Bentley, Elsecar, Barrow, and Kellingley collieries, and schemes are also in course of preparation for Kiveton Park, Ackton Hall, and Old Roundwood.

No deep boreholes were put down during the year. In 1960, boring is expected to be confined to short underground boreholes to prove continuity of seams at existing collieries.

The driving of tunnels to develop new areas of coal continues. Emphasis is placed on both speed and efficiency, and the average measure of efficiency at the present time is 3 cub. yd./manshift. The best achievement in the division is at Parkhill Colliery, where 4.8 cub. yd./manshift has been attained consistently.

Expansion of Manriding

Manriding continues to be extended. During 1959, 22 new installations covering 13 miles were installed, 13 installations were extended over an aggregate of two-and-a-half miles, and at the end of the year the total mileage of manriding installations in the division was 245. During 1960 and 1961, a further 61 manriding installations will be installed and 35 existing installations extended. Manriding facilities are now provided for approximately 58,000 underground workers in the division which represents 55 per cent. of the total.

Following the successful installation at Maltby Colliery, friction winders are now being installed at Grimethorpe, Houghton, Manton, Kellingley, Fryston, and Brodsworth. The double winders mounted in a concrete tower over No. 6 shaft at New Monckton are the first of this type in the division and were completed and successfully commissioned in 1959.

Metal Statistics 1949-1958

The 46th annual issue of Metal Statistics compiled by Metallgesellschaft AG, Reuterweg 14, Frankfurt-on-Main, Germany, covering the period 1949-1958, has recently been published. It includes a review of the metal industry in 1958 and the first half of 1959 besides the usual statistical tables on aluminium, lead, copper, zinc, tin, cadmium, magnesium, nickel, mercury and silver.

FORTHCOMING EVENTS

JANUARY 28

Coke Oven Managers' Association (Northern Section): Meeting at the Three Tuns Hotel, Durham, at 7 p.m.: "Trends in Blast-furnace Economy," by J. Lockerbie and J. B. Bowie.

FEBRUARY 4

Midland Institute of Mining Engineers: Meeting at the Danum Hotel, Doncaster: "Measurement of Strain in Concrete Shaft and Roadway Linings," by R. Shepherd and A. H. Wilson.

FEBRUARY 6

North of England Institute of Mining and Mechanical Engineers: Meeting in the institute lecture theatre, Neville Hall, Newcastle-upon-Tyne, at 2.30 p.m.: "Prop-load Measurements Underground," by J. D. Jenkins and I. Storey.

FEBRUARY 8

Lincolnshire Iron and Steel Institute: Meeting at the North Lindsey Technical College, Scunthorpe, at 7.30 p.m.: "Special Steel Production," by F. C. Martin.

FEBRUARY 10

North Wales Metallurgical Society: Meeting in the lecture theatre, Flintshire Technical College, Connah's Quay, nr. Chester, at 7 p.m.: "Prospects for the Continuous Casting of Tonnage Steel," by J. Savage.

Institute of Metals: Meeting at the institute headquarters, 17, Belgrave Square, London, S.W.1: "Solidification of Alloys," by W. C. Winegard.

Institution of Plant Engineers (Dundee Branch): Meeting at Taypark Hotel, West Ferry, at 7.30 p.m.: "Uses of Aluminium in Engineering.

FEBRUARY 11

Institution of Mechanical Engineers (East Midlands Branch): Meeting at the Technical College, Chesterfield, at 7.15 p.m.: "Future Trends in Coal-mining Machinery," by J. R. Ashley.

Manchester Geological and Mining Society: Meeting at the Wigan and District Mining and Technical College, at 4 p.m.: "Experiments with Roadway Supports," by J. G. Hind.

Society of Chemical Industry (Corrosion Group): Joint meeting with the Liverpool Section, Liverpool Metallurgical Society, and College Scientific Society, at the College of Technology, Byrom Street, Liverpool, at 7.30 p.m.: "Recent Research on the Corrosion and Protection of Iron and Steel," by J. C. Hudson.

FEBRUARY 12

Normanton, Castleford and District Mining Society: Meeting at the Whitwood Technical College, Castleford, at 7 p.m.: "Manpower Saving Devices," by S. C. Walker.

Southern Counties Institute of Mining Engineers: Meeting at the headquarters of the Institution of Mining Engineers, London, S.W.1: "Contributions of Metallurgy to the Coal-mining Industry," by A. Latin.

Manchester Association of Engineers: Meeting at the Engineers' Club, Albert Square, at 6.45 p.m.: "Future of Coal Preparation," by J. E. Chick.

FEBRUARY 15

Institution of Electrical Engineers (Sheffield Sub-Centre): Meeting at the Angel Hotel, Brigg, at 6.45 p.m.: "DC Winder Drives using Mercury-arc Rectifier/Inverters," by L. Abram, J. P. McBreen, and J. Sherlock.

National Association of Colliery Managers

JANUARY 29

Kent Branch: Annual general meeting at the Swan Hotel, Deal, at 7.15 p.m.: "Cementation and Silicatization of Betteshanger Shafts," by H. Fairclough.

FEBRUARY 1

South Midland Branch: Meeting at the Rescue Station, Ashby-de-la-Zouch, at 4 p.m.: "Mechanization—Taking Stock," by R. Lansdowne.

FEBRUARY 9

Yorkshire Branch: Meeting at the Miners' Welfare Hall, Brodsworth, at 3 p.m.: "Solid Stowing on a Mechanized Face at Wharncliffe Silkstone Colliery," by E. E. Crankshaw.

FEBRUARY 15

Midland Branch: Meeting at the Denman's Head, Sutton-in-Ashfield. Paper by N. Siddall.

FEBRUARY 24

Lancashire Branch: Meeting at the offices of the North Western Divisional Board, Manchester, at 4 p.m.: "Recent Experiences of Caving in the St. Helens Area," by J. Abbott.

FEBRUARY 26

Kent Branch: Meeting at the Swan Hotel, Deal, at 7.15 p.m.: "Some Recent Developments in Underground Mechanization," by A. G. Douthwaite.

New Range of Underground Conveyor Belts

INTRODUCTION of Fenaplast Diamond-type conveyor belting by J. H. Fenner & Company, Limited, Marfleet, Hull, offers the user a range of belts having graded properties suited to various colliery requirements, and therefore enables the most suitable belt to be selected for any particular application. Two belts in the range are available immediately, and in the near future others will be introduced.

The carcase has both a nylon warp and a nylon weft and imparts a very high rip resistance in both directions, either along the length or across the width of the belt. Weft strength of the Diamond-type belting is 500 lb., while for the heavier Diamond type, it is 750 lb. The warp ripping figure is even higher and these factors have, therefore, eliminated the incidence of edge ripping.

Impact resistance tests have been carried out on the new range using a ¼-in. dia. spherical indentor, to impart repeated blows of 60 ft.-lb. With the Diamond type, after between 200 and 300 blows, the belt was only punctured at the point of impact and all other yarns were still sound. Between 1,600 and 1,850 blows were delivered on the heavy Diamond type before the belt was punctured. With five-ply cotton belt, breakage occurred after between 10 and 60 impact blows. During the test it was also found that when a Diamond-type belt was punctured, the damage was localized and was not able to spread through the belt.

All belts in the range are manufactured with approximately the same weight and thickness. Diamond belting is designed primarily for use on the coal face, but it can also be used on gate- and trunk-belt conveyors. The heavier type of belting is designed for duty on very long or heavily loaded gate- and trunk-road belt conveyors, and has a breaking load of over 3,000 lb./in. width.

Trepanner Haulage Tension Device

A MEANS of reducing the length of the stable hole on trepanner coal faces by up to 6 ft. has been devised by Mr. J. Goulding, specialist engineer in No. 4 Area Mechanization Department, North-Eastern Division, National Coal Board.

It involves taking the haulage chain of the trepanner round idler sprockets under the conveyor gearhead, and mounting the chain-tensioning arrangement on the goaf side of the conveyor. The idler sprockets are fitted to the ram skid under the gearhead, and allow the haulage links to remain horizontal while passing round them.

Other arrangements already exist for mounting the tensioning device on the goaf side of the conveyor, but in these the trepanner chain is not brought to the goaf side, being connected instead to the tension arrangements by a rope fitted under the first grading pan next to the gearhead.

The virtue of Mr. Goulding's arrangement is that by placing the diverting sprockets under the gearhead, the trepanner can be drawn right up against the gearhead. This means that up to 6 ft. can be saved in the length of the stable hole, which in many cases can mean the saving of one man per shift in each stable.

Mining Oversea

in which we review, from time to time, interesting mining matters reported by our contemporaries abroad

MINING BY LONG SHOTHOLES

AN interesting method of mining a steep coal seam of 8 ft. to 10 ft. thickness has been introduced at a coal mine in the Kuzbass, USSR. The seam is sub-divided along the dip by sub-levels, about 100 ft. apart. The distance between the sub-levels is mined to the full width by boring long shotholes of 4 in. dia. in the middle of the seam to the full distance from the top gate to the "draw-off" bunkers at the bottom.

The distance along the strike from hole to hole varies from 3 to 5 ft. The holes are charged and filled with water shortly before they are fired. This results in good blasting efficiency and in excellent dust suppression. The explosives consumption is approximately 10 oz. per ton of coal, the o.m.s. was increased and the cost per ton was also reduced.—"Ugol," August, 1959.

HYDRAULIC ROOF SUPPORT

EXPERIENCE with hydraulic roof support units in several coal faces of the Friedrich Heinrich Colliery has culminated in the re-designed model, shown in Fig. 1. The new frame has an increased hydraulic stroke of 8 in. instead of 5¼ in., and can support a nominal load of 40 tons at a maximum

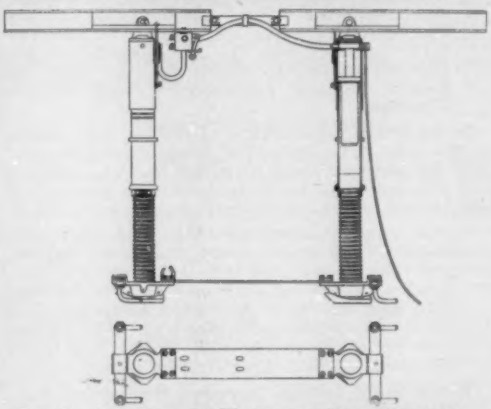

FIG. 1.—RE-DESIGNED HYDRAULIC ROOF SUPPORT.

hydraulic pressure of 3,500 lb./sq. in. It is suitable for seam thicknesses from 3 ft. 9 in. to 8 ft. 3 in. All hydraulic hoses and fittings are now arranged along the top of the unit which keeps them clear when advancing the unit, and makes them less exposed to damage.

The accident rate in the coal faces equipped with these hydraulic supports has fallen, and roof convergence is now much more uniform. Savings in wages more than offset the higher capital cost in comparison with conventional friction-type steel props.—H. MERKEL and G. KECK, "Glückauf," August 15, 1959.

OUTSIZE HYDRO-COLLIERY FOR USSR

THE planning institute Dneprogiproschacht, in the Ukraine, has just completed a scheme for the first outsize colliery with complete hydraulic coal-getting and transport for an output of 20,000 ton/day. The shaft will be located in an area of almost 11 sq. miles in which 16 seams, varying in

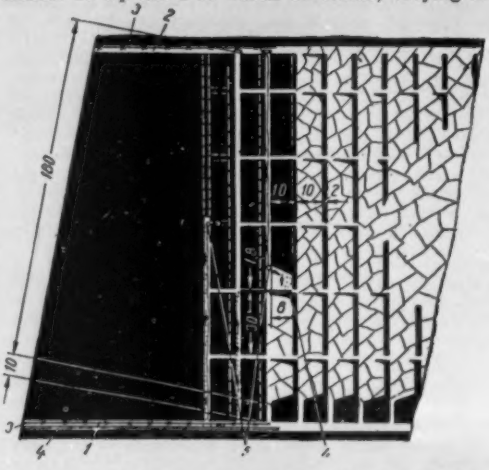

FIG. 2.—METHOD SELECTED FOR OUTSIZE HYDRO-COLLIERY.

1—GATHERING ROAD; 2—RETURN AIRWAY; 3—WATER MAINS; 4—GUTTER; 5—HYDRAULIC MONITOR.

thickness from 2 ft. 4 in. to 4 ft. and at gradients from 7 to 12 deg., occur. The life of the mine is planned to be 45 to 50 years. The capital costs for the complete colliery will be 15 to 20 per cent. less than for a conventional colliery, while the o.m.s. is expected to be 100 per cent. higher. Open gutters will be used from the faces to the shaft and powerful slurry pumps are to raise the coal/water slurry to the surface at a rate of 330,000 gal./hr. Fig. 2 shows the method selected, which is based on rooms of 26 ft. 3 in. wide and 198 yd. long with 6-ft. 6-in. pillars between them. The expected coal loss is 20 per cent.—I. N. SURDUTOVITCH, "Ugol," May, 1959.

CANADA is the world's fourth largest producer of magnesium ingot, being surpassed by the United States, the Soviet Union, and Norway. The United Kingdom is also a substantial producer. The installed primary ingot capacity of the Canadian industry is now 13,000 short tons a year.

Passing Thoughts . . .

WORKS numbers are useful devices to aid office administration, but they should never become attached to the men to whom they refer. The manager who regards his workmen as just so many hands will be equally unknown to them. There is, after all, something worse than a tyrannical ironmaster in the Victorian tradition, and that is to have no recognizable boss at all.—H. E. ROFF, in an article in The Scotsman.

I don't see the problem as a competition between coal and oil. In the long run these are supplementary raw materials and the day may well come when humanity will regret having ever burnt a ton of either of them!—Letter in the Financial Times.

One of the most costly results of marital trouble is the impaired morale and efficiency of the man or woman who takes to work the anxiety and misery that flow from domestic discord. These preoccupations have an obvious bearing upon absenteeism, time-keeping, and output; upon accidents arising from inattention, and upon harmonious relations at work both between workpeople and in relations to management.—VISCOUNT KILMUIR, the Lord Chancellor.

One of the objects of my union is to ensure the abolition of capitalism.—MR. WILL PAYNTER, *general secretary of the National Union of Mineworkers, at a Daily Worker national discussion conference in London.*

It is not by boycotting oil that mineworkers will bring security of employment to their industry. It is by helping the Coal Board to relate manpower to the foreseeable demands for coal.—Sheffield Telegraph.

The [coal] industry has done a job, with a sense of social responsibility, that could only *have been done under nationalization.*—CHARLES TIMAEUS, *in Reynolds News.*

It would surely show more confidence in the permanence of the increase in efficiency which was achieved by the mines last year if the [National Coal] Board were to declare not simply that it would try to ensure that coal prices did not rise, but that it was determined to bring them down. It is not necessary to believe in the value of bargain sales to see that such an attitude would be the best possible advertisement for coal. Like all advertisements, it would be most effective if it were justified in the event.—Daily Telegraph.

It is not sufficient to condemn British practice and technique because a different method is adopted elsewhere, nor to assume that the British shipbuilder has not even considered the alternative.—MR. JOHN BROWN, *managing director of John Brown & Company (Clydebank), Limited.*

It is equally dangerous and foolish to think that what comes out of a foreign yard is necessarily second rate—nothing could be further from the truth. During my travels abroad four things have impressed me greatly—lack of friction between workpeople and management; between workpeople themselves; a willingness of yards to give the customer what he wants; a keenness to learn, and an after sales service second to none.—MR. J. W. COMMON, chairman of the North of England Shipowners' Association.

Coal mining is still what Shaw said it was, an atrocity, and village living is the accomplice to the atrocity.—CLANCY SIGAL, *an American, describing his visit to the Yorkshire coalfield, in an article in the Daily Herald.*

100 YEARS AGO.—Reports were current in Paris yesterday, and generally believed, that an arrangement had been concluded between the British and French Governments, by which English iron and coal will be admitted into France on payment of a moderate duty, and that French wines will be received into England on similar terms.—Glasgow Herald.

I wonder just how much time is wasted throughout the business world by the illegible signature? How much longer is it going to be the fashion for people to use unreadable and ridiculous squiggles by which to identify themselves when signing correspondence, documents, etc.—Letter in the Financial Times.

Non-manual workers have a tremendous amount of grievances to settle, but we have not used the strike weapon because we lack the strength of our industrial colleagues. I hope this will be noted by our colleagues in heavy and light industries, and I appeal to them to give some of their vigour and militancy to back up the cause of non-manual workers.—SIR TOM O'BRIEN, general secretary of the National Association of Theatrical and Kine Employees, and representative of the non-manual workers' group on the TUC General Council.

A doctor who listened to an electric saw for three and a half hours took two days to regain his normal hearing.—DR. P. J. T. CHALLEN, *of the Slough Industrial Health Service.*

A fine at the Sheriff Court makes no impression on a miner. Some of them are getting £25 and £30 a week for work we used to do for £1 in the old days, so they can afford to pay up. What I say is ban them for life. Forbid them ever to show face at a coal mine again.—MR. FRANK DUFFY, who, until his recent retirement in his 80th year, was believed to be the oldest working pit shotfirer in Scotland, commenting on "the man who persisted in smoking in a safety lamp mine."

Coal accumulates, pits close. But my coal merchant confides that his stocks are rather low and that manned flight to the moon is in somewhat better prospect than my being assured of two bags of best quality household nuts. May one mutter "Floreat petroleum"?—Letter in The Guardian.

Is the present capitalization of rail and coal realistic in the light of the industries' future earning powers? Will the proposed measures ensure that our transport and fuel costs will be at least equal to those which will be paid by our competitors?—Letter in The Times.

A letter addressed to:—Messrs. Joskbkrovgers & Sons, Cutlerstoeismajestry, Sheibbielo, England, was correctly delivered to Joseph Rodgers & Sons, Limited, cutlery and silver manufacturers, of Pond Hill, Sheffield, three days after being posted in Aden. The safe arrival is also reported of a parcel from India addressed to:—The Stanton Iron Works Company, Limited, Near Nothing Home.

Within a few minutes of ending their annual Press conference on the working of the Yorkshire coalfield, leaders of the North-Eastern Divisional Coal Board yesterday exchanged the Wedgwood-blue and polished walnut atmosphere of the conference room for the homelier surroundings of the boiler room in the basement of their headquarters at The Lodge, Doncaster. —Yorkshire Post.

Coal Consumers' Stocks

WARNING BY WEST MIDLANDS COAL BOARD CHAIRMAN

WARNING to coal consumers not to let their stocks run too low was given by Mr. E. H. Browne, chairman of the West Midlands Divisional Coal Board, in Birmingham yesterday (Thursday). Ample stocks were held by the board for industrial consumers, but any prolonged spell of severe weather, with the sickness that usually went with it, could well bring transport difficulties, and if at the same time there was a sudden spurt of orders, it could be hard to deal with them, he said.

Pointing out that the Ministry of Power had drawn attention recently to the low level of consumer stocks and the attendant dangers, Mr. Browne said it seemed likely that consumers in general had run down their stocks to the lowest ebb and were reaching the point at which they would not be able to carry on without replenishment.

MR. E. H. BROWNE

With the expected increase in consumption from expanding production in most industries, some improvement in demand for coal might now be expected. It was, in fact, beginning to show itself. In the West Midlands they had been adding to stocks each week until Christmas; since then they had been taking coal from stock in increasing quantities. The indications were that production and demand had now been brought into balance.

Manpower Causes Anxiety

Mr. Browne said that the extra cost in adding to coal stocks was the dominating factor in the West Midlands Division's results in 1959. Productivity had shown a good improvement, in spite of reduced output. The adjustment of production to the current level of demand had been carried out with the intention of avoiding, as far as possible, damage to the future position; but in the West Midlands manpower had slid away at a rate which caused anxiety.

The total amount of West Midlands coal disposed of in all markets in 1959 was 14,100,000 tons, compared with 15,900,000 tons in 1958. That was a reduction of 11.3 per cent. It was brought about to some extent by the reduced demand for coal for electricity generation in the North West Region following conversion to oil at Ince and Bromborough power stations.

West Midlands output in 1959 was 15,947,000 tons. In 1958, 320,000 tons was produced by Saturday working in the early months of the year. Including that, output was 16,900,000 tons. Thus, of a total reduction, in 1959, of nearly 1,000,000 tons, 715,000 tons resulted from reduced output in the normal five-day week—a curtailment of 4 per cent. That was in line with the NCB's policy to adjust output, over a period, to the lower level of current demand. But the position in the West Midlands differed from that in most other parts of the country, as losses of manpower had occurred at a rate which had themselves led to a sharply reduced production level, particularly as the end of the year approached. Although the overall reduction in five-day week output was only 4 per cent. for the year, in the latter months production was about 8 per cent. beneath that in the corresponding period of 1958. For the moment, the coal had not been wanted; but if the downward trend of manpower continued—indeed, unless it was reversed—the pendulum would swing too far.

In 1959 there was a substantial increase in productivity in the West Midlands Division. Output per manshift rose by over 4 cwt. at the face and by 1 cwt. overall, to 86 cwt. and 26.6 cwt., respectively, increases of 5 per cent. and 4½ per cent.

COAL FOR BARNSLEY AT SNAIL-PACE SPEED

"QUITE remarkable increase in traffic during the last two months, coupled with staff shortages," was given by Mr. E. R. Williams, traffic manager of British Railways' Eastern Region, as the reason for delay to coal wagons from local pits destined for Barnsley coal merchants. He was replying to a letter from Mr. Roy Mason, Labour MP for Barnsley, who had suggested that wagons which took five days to do the eight-mile journey from Grimethorpe and Cortonwood collieries could only be assumed to have been lost.

Commenting on the recent closing of marshalling yards at Stairfoot and centralizing traffic at Wath, Mr. Mason said it was "economy run mad." Local traders were annoyed and considering road transport as a more suitable method of getting coal supplies.

Mr. W. H. Sales, chairman of the North-Eastern Divisional Coal Board, at a Press conference on Monday at which he presented his annual review of the working of the division, also had something to say about rail transport. During the past four weeks 150,000 tons had been lifted from Yorkshire's ground stocks, he said. It could have been twice as much if railway wagons had been available.

LAST YEAR some 120,000 metric tons of fine sheet was produced at Poland's Lenin steelworks. Production target for this year is 240,000 tons and 700,000 tons per year by 1965.

Appointments

New General Manager for AEI at Rugby

TO enable the present general manager, Mr. H. E. Cox, to devote his time to the duties of deputy director of manufacture, Mr. D. EDMUNDSON has been appointed general manager of the Rugby works of A.E.I. (Rugby), Limited, formerly the British Thomson-Houston Company, Limited. Mr. Cox has been general manager since 1957.

Mr. Edmundson received his engineering training at the former Rugby College of Technology and Arts and served an engineering apprenticeship with BTH. In 1934 he became a design engineer in the a.c. engineering department, Rugby, and liaison engineer with the motor department at Trafford Park, Manchester. He was appointed to the head of the electrical laboratory in 1940 and in 1946 became test engineer at the Rugby works, eventually becoming superintendent of the test department. He was appointed assistant manager, manufacturing, in 1957 and was promoted manager, manufacturing, at the beginning of last year.

A member of the Institution of Electrical Engineers, Mr. Edmundson was awarded the institution's Silvanus Thompson Premium. He is a past chairman of the Midland section of the Society of Instrument Technology and a past secretary and chairman of the Rugby sub-centre of the Institution of Electrical Engineers. At present he is chairman of the engineering advisory committee of Rugby College of Engineering Technology.

Mr. D. M. E. CHRISTIE has been appointed Lecturer in Mechanical Engineering in the Department of Engineering in the University of Wales.

Mr. G. MARCHANT has been appointed general manager of the Wolverhampton and Hednesford factories of the Fafnir Bearing Company, Limited.

Mr. C. ATKINS has been appointed sales manager of the Wardle Engineering Company, Limited, Manchester, in succession to Mr. J. H. Jordan, who has retired after 45 years' service.

Mr. A. NADIN has been appointed general manager of Brayshaw Furnaces, Limited, and Brayshaw Tools, Limited, Manchester. He was formerly works manager of both companies.

Mr. ALAN J. MARLES has been appointed technical manager of Ransome & Marles Bearing Company, Limited, Newark-on-Trent. Previously an assistant technical manager, he will take up his new duties on February 1.

Mr. K. W. SIMS has been appointed export promotion manager of C. C. Wakefield & Company, Limited, London, N.W.1, the parent company of the Castrol Oil group. He is 39 and joined the company in 1951 as an industrial oils sales representative. He has since served as resident manager for the Middle East, in Cyprus, and as sales manager of the American subsidiary.

Mr. W. THOMPSON and Mr. E. SMYTH have been appointed joint general managers of the Peterborough engineering firm of Peter Brotherhood, Limited. Mr. K. GRANT has been appointed assistant general manager and Mr. P. S. WHOLLEY has been appointed technical assistant to the joint general managers. Mr. Thompson joined the company over 45 years ago, Mr. Smyth joined it 13 years ago, Mr. Grant joined in 1938, and Mr. Wholley has been at Peterborough for five years.

Mr. A. W. EVANS, formerly sales manager of Air Control Installations, Limited, Ruislip (Middx), has been appointed manager of Ambuco, Limited, manufacturers of custom engineered industrial dust recovery systems, of London, W.1. He will be spending the next two months in America with the parent company, Buell Engineering Company, Inc. He will be accompanied by his chief assistant, Mr. W. F. Morrison.

Mr. C. D. WILD has been appointed service manager at the Clay Cross (Derbyshire) branch of Bowmaker (Plant), Limited, Willenhall (Staffs). He served his apprenticeship with Mirrlees, Bickerton & Day, Limited, diesel engine manufacturers, of Stockport, and joined Bowmaker (Plant) in 1955. Mr. V. L. MULLOWNEY has been appointed area manager for South Wales. Since joining the company last year, he has been engaged on the co-ordination of an extensive rebuilding programme designed to house the firm's expanded activities at Cannock, Cardiff, and Exeter.

Mr. E. STEELE, who has been appointed Area production manager of the South Staffordshire and Shropshire Area of the West Midlands Divisional Coal Board, took up his new duties on Monday. He was formerly mining operations engineer of the division's North Staffordshire Area. Mr. Steele, who has spent all of his mining career in the west Midlands, began work as a boy at Chatterley Whitfield Colliery, where he remained for over 10 years. He then joined Talk-o'the-Hill Collieries and when they closed he was transferred to Holditch Mines, Limited. After managing Glasshouse Colliery for three and a half years he joined the Safety in Mines Research Board as an investigator. He became manager of Norton Colliery and at vesting date he was appointed Area planning engineer, North Staffordshire Area. Mr. Steele assumed his present post some three years ago. He is a past president of the National Association of Colliery Managers.

MR. E. STEELE

Mr. W. T. ARCHER has been appointed to the post of Group manager of No. 3 Group in the North Staffordshire Area of the West Midlands Division of the NCB. His earlier mining experience was gained in the north Staffordshire coalfield in 1954. After eight years as manager of Victoria Colliery, he became agent of Bradford Colliery, Manchester, in the North-Western Division. The following year he was appointed to his present post of Group manager of the No. 1 (Manchester) Group. During his period at Manchester, Mr. Archer was in charge of the reconstruction of Bradford Colliery.

MR. J. E. C. BAILEY, chairman and managing director of Baird & Tatlock (London), Limited, scientific instrument manufacturers, of Chadwell Heath (Essex), and Hopkin & Williams, Limited ilemite producers, of London, S.W.1, will leave the UK by air on January 30 to visit the companies' branches, agents, representatives, and customers throughout east, central, and South Africa.

East Midlands Mining Manpower

INTENSIVE RECRUITING CAMPAIGN TO BE LAUNCHED

BECAUSE the East Midlands Division—one of the National Coal Board's most productive and profitable divisions—will need 9,000 more miners this year, it is to embark on an intensive recruiting campaign. Making this announcement at a Press conference on Tuesday, the divisional chairman, Mr. R. Ringham, said that manpower had fallen by more than 4,000 during 1959, mainly in the closing months of the year. Men were still leaving because they had no confidence in the industry and it was a " colossal problem " to restore the labour force.

Only 1,882 juveniles were recruited during the year as against 2,514 in 1958—a total very much less than the immediate and long-term prospects which the industry required. The division was committed to an output of 44,000,000 tons for 1960 and to achieve this it required a substantial increase in manpower at a number of collieries on the eastern side of the coalfield, in the Mansfield, Edwinstowe, and Nottingham Areas.

Mr. Ringham promised vigorous recruitment linked with a publicity campaign and said that it was hoped that when this change of policy became fully known it would restore confidence and they would get the labour, both adult and juvenile, required and, also, that wastage would revert to normal proportions. Wastage in 1960 would be aggravated by the retirement of some 2,000 men reaching 65.

Another O.M.S. Record

By 1965 the division ought to be producing an extra 5,000,000 tons above the 1959 figure of 44,877,000 tons.

That was going to be no mean task, Mr. Ringham said, but he was able to point to " more than encouraging " productivity figures. Output per man-shift at the face at 111.28 cwt. again constituted a record, being an increase of 6.44 cwt. over the 1958 figure.

The overall o.m.s. at 40.02 cwt. was not only a record, being an increase of 1.64 cwt. over the previous year, but was the first time the East Midlands or any division had reached the coveted 40 cwt. for the whole of the division for the whole of one year.

Tonnage of coal mechanically loaded was 51.41 per cent. of divisional output, compared with 45.97 per cent. in 1958.

Speaking of development and planning, the chairman said that at Bevercotes underground drivages were proceeding in the Dukeries Seam for the development of the first coal production panels. There had been a setback at Cotgrave, where the presence of bands of gypsum in the water-bearing strata had necessitated the installation of cast-iron tubbing in both shafts in the affected area.

It would cause a considerable delay and expense which as yet they were unable to quantify.

Number of fatal accidents—22—was 18 less than in 1958 and the lowest ever recorded for the division. Number of non-fatal reportable injuries (262) was about the same as in 1958 and the overall accident rate at 83.0 per 100,000 manshifts compared with 82.6 the previous year and a national average of 145.

BRODSWORTH MINERS RETURN TO WORK

MORE than 3,500 miners at Brodsworth Colliery—Yorkshire's biggest pit—returned to work on Monday after having been on strike since Thursday of last week. After a stormy mass meeting on Sunday Mr. Alwyn Machen, president of the Yorkshire Area of the NUM, said the men felt that the operation of the conciliation machinery by the management and particularly by the higher management was completely unsatisfactory.

They considered that branch representatives were being frustrated in their efforts.

Mr. William Kellher, NUM branch secretary, maintained that the position had worsened in the past two or three years. The management was unbending and rigid in its attitude, prejudging the issue and refusing to alter or modify its views.

The men were called out on Thursday after a mass meeting was held to discuss two strikes at the pit which had affected about 380 miners. The branch claimed that following a fatality fillers were unable to fill, owing to the shortage of mine cars. The management was said to have paid the lowest possible figure of 37s. instead of the normal fall back pay of 57s.

Other men were being paid 37s. a shift on the unfounded charges by officials of withholding effort.

Mr. Machen, Mr. W. H. Sales, chairman of the North-Eastern Divisional Coal Board, and other NUM and NCB officials met on Saturday to discuss allegations of cuts in miners' wages and allowances and again on Tuesday to discuss the Brodsworth dispute. It was later stated by Mr. Machen that all aspects of the latter had been settled.

Hardship at the Surface

"WOEFULLY inadequate and a disgrace to mining" is how Mr. J. Davis, inspector of Philadelphia (Co. Durham) Mines Inspection Board, describes legal requirements for the safety and health of miners who work on the surface in his quarterly report issued on Monday. The board is responsible for 26 collieries in north-east Durham.

Mr. Davis singles out for criticism a new washery which has been erected at one colliery at a cost of the major part of £1,000,000. It has a cold, damp atmosphere, he says, and there have been bitter complaints from workmen of the lack of heating and simple facilities for boiling water or heating food in cold weather.

Living With Full Employment May Prove Difficult

"WE have in the past had to learn to live with poverty; we have had to learn to live with war—grim lessons indeed—but the issue for the next decade seems to be, can we live with full employment?" asks Mr. Harry Douglass, general secretary of the Iron and Steel Trades Confederation in the current issue of the union's journal, Man and Metal.

MR. HARRY DOUGLASS

Warning that living with full employment may prove the most difficult task of all, Mr. Douglass points out that signs are not wanting that the cup of prosperity is a little too heady for some and it should be remembered that "it is easy to topple boom into inflation." "There are many ways," he writes, "of killing the full employment goose and losing the golden eggs of prosperity and opportunity."

Trade Unions' Immense Responsibility

The surest way seemed to be to live in the past and to build on the shibboleths arising from out-of-date economics instead of accepting the changes which had come about since they studied economic and social science textbooks now outdated by progress. The task was not an easy one. "Even a popular leader like Mr. Gaitskell was severely jostled for even suggesting that our ideas should match changing times."

Reminding his readers that scientific and technical research were today progressing at an astonishing rate which would overwhelm statesmen, employers, and trade union officials who failed to recognize the fact, Mr. Douglass states that good trade union practice is only possible with sensible employers, and good industrial management is only possible with sensible trade unions. "There can, of course, be strong trade unionism without good trade union practice; indeed, with foolish employers this is often inevitable, but I am afraid that we cannot always lay the blame at the door of the employers."

The fact was that trade unions today carried an immense responsibility which was apt to become irksome at times, particularly to those whose normal reaction was to find someone to blame for the problems with which they were confronted rather than to find a solution for them. "Brilliant speeches by loquacious delegates are no substitute for sensible bargaining around the negotiating table," he points out, adding that such negotiations were in fact a business deal and both sides were much more likely to find agreement if the resources from which improved wages and conditions were to come were ample. A meagre treasury too often meant a meagre pay packet and could, in the ultimate, mean no pay packet at all.

Unproductive labour or capital was the concern of both sides of the table. Wages, equally with dividends, had a dependence on the balance-sheet which it was unwise to ignore. "It is much easier for trade union leaders to tub-thump the vices of the employers than to accept the responsibility trade union office carries today.

"There is not only the foreign competitor to deal with today; there is also the competitive material—for example, prestressed concrete, plastics, and light metals have made inroads in fields traditionally held by steel. The solution of old problems in itself begets new problems. New methods of steel melting, casting, and rolling jolt all concerned out of their complacency. Good labour relations are easily strained in these circumstances.

"All the wisdom possessed by both sides of the table will be needed if the problems of this present decade—the 1960s—are to be solved as they must be if capital and labour are to get their just reward."

With Mr. Frank Cousins, general secretary of the Transport and General Workers' Union, Mr. Douglass is to fly to India today (Friday) on a goodwill mission on behalf of the TUC. They will be the guests of the Indian National TUC.

Heavy Capital Spending by Lancashire Steel

GROUP capital expenditure by the Lancashire Steel Corporation, Limited, in the 53 weeks ended October 3, 1959, totalled £2,035,721 and at the balance-sheet date outstanding commitments of subsidiaries amounted to £865,000 (£1,135,000). Group net income expanded from £1,235,989 to £1,923,440 and the dividend is effectively raised from 7 per cent. to 8½ per cent. on a capital doubled by a scrip issue.

The second stage of the new blast-furnace bunker system at the Irlam works was completed during the year and further progress made on the construction of the second large capacity blast furnace and the installation of the new continuous billet mill, both of which are nearing completion. At the Warrington works the new cooling bed is also nearly completed. New wire-drawing machinery and a nail packaging plant have been installed at the works of Rylands Bros., Limited.

Considerable expenditure has been incurred in providing and maintaining the equipment of other subsidiaries and progress has been made in the development of Pearson Knowles & Rylands Bros. N.Z., Limited, and of Lancashire Steel (Rhodesia) (Private), Limited.

European Foundry Apprentice Competition

THIS year's European Foundry Apprentice Competition is to be staged in the UK during the week beginning May 22 and it is expected that apprentices from 12 or more nations will take part. Entrants will be received in Birmingham on May 22 and will take the written part of the test at the National Foundry College, Wolverhampton, on Monday. The practical tests will take place at the steelworks of F. H. Lloyd & Company, Limited, Wednesbury, on Tuesday and Wednesday.

At the Birmingham College of Advanced Technology on Thursday the drawing section of the contest will be held and there will be a day and a half's sightseeing at Stratford-upon-Avon and London. Dr. J. G. Pearce is chairman of the panel of judges, which will be formed by experts from the individual countries taking part.

Company News

PROSPECTS FOR TUBES

S & L Chairman's Report for the Year

HOME trade prospects for 1960 for general-purposes tubes are better than they have been for some time and export trade demand is likely to remain strong—at least for some months ahead—states Mr. A. G. Stewart, chairman and general managing director of Stewarts and Lloyds, Limited, in his annual review. He warns shareholders, however, that there are still doubts about prospects in the near future so far as the oil industry is concerned. In the 53 weeks ended October 3, 1959, tonnage despatched to the oil industry was 41 per cent. less than in the previous year.

Mr. Stewart also refers to clear signs of a revival in the ironfounding industry which has already brought about an improvement in foundry pig-iron business. Ingot steel production from the Bilston, Corby, and Clydesdale works was 90,000 tons more at 1,414,000 tons. Steel tube tonnage was 4 per cent. lower at 833,000 tons and that of spun-iron pipes and castings is practically unchanged at 333,000 tons.

Some good orders for seamless tubes were obtained from Russia which would be of considerable assistance in filling the cold-drawn seamless capacity in the first six months of the current year. Overall, the tube works again operated at 79 per cent. of capacity. The group net profit is £5,799,000 (£6,912,000) and the dividend is held at 11 per cent. A similar total has been forecast for 1959-60 on the ordinary capital increased to £27,000,000 by the rights issue.

Mr. Stewart proposes to refer to the removal of the threat of nationalization of the steel industry at the annual meeting on February 10. Following the meeting there will be an extra-ordinary meeting to consider increasing the authorized capital to £60,000,000 by the creation of 20,000,000 £1 unclassified shares. There is no present intention of issuing any further shares and members are told that the directors will not make any issue which is likely to result in a change of control or in the general nature of the group's activities without further reference to them.

BENNIS COMBUSTION, LIMITED—There will be no interim dividend for the year ending April 30, 1960, as before.

RUSTON & HORNSBY, LIMITED, engineers, iron and steel founders, of Lincoln—Rumours of a take-over bid for the company have been denied by the joint managing director, Mr. V. Prehn.

S. RUSSELL & SONS, LIMITED, ironfounders, mechanical and structural engineers, etc., of Leicester—There is to be a one-for-one scrip issue to holders of February 1. An extra-ordinary meeting will be held on February 25.

WESTINGHOUSE BRAKE & SIGNAL COMPANY, LIMITED—The dividend is raised to 11 (10) per cent. for the year ended October 3, 1959. Group trading profits rose to £2,557,488 (£2,035,101), tax is £1,121,503 (£997,683), and the group net profit is £1,286,795 (£879,235).

EDGE TOOL INDUSTRIES, LIMITED—A higher dividend of 17½ (15) per cent. with a final of 12½ per cent. is being paid for the year ended September 30, 1959. Group profits rose to £147,126 (£77,392), tax accounted for £68,829 (£45,639), and the net profit is £78,297 (£31,753).

CENTRAL WAGON COMPANY, LIMITED—For the year ended September 30, 1959, the company is repeating the 15 per cent. dividend with a 10 per cent. final. Last May holders received a capital distribution of 1s. per 10s. unit, not subject to tax, and the directors are now considering further capital distributions.

TUNNEL PORTLAND CEMENT COMPANY, LIMITED—Interim dividend for the year to March 31, 1960, is being raised to 3½ (2½) per cent. The previous year's final was 9½ per cent., making 12 per cent., less tax, and a special distribution of 1 per cent., not subject to tax, was paid out of realized profits on investments.

MITCHELL, SHACKLETON & COMPANY, LIMITED, steel-forgers, makers of crankshafts, of Patricroft (Lancs)—There is a final dividend of 10½ per cent. making 15½ per cent. (13 per cent. plus special interim of 2½ per cent.) for the year ended September 30, 1959. Group profit was £90,434 (£104,825) and tax amounted to £78,750 (£113,000).

BRITISH BENZOL & COAL DISTILLATION, LIMITED—The chairman, Mr. Geoffrey Edwards, forecasts a bright future for the company, "given a continuance of the present level of industrial activity." The plant is now working to capacity and the principal customers have indicated that the present order rate seems likely to continue through 1960.

MORGAN CRUCIBLE COMPANY, LIMITED—The interim is being maintained at 5 per cent. on capital increased by a two-for-five scrip issue for the year to end-March, 1960, an effective rise of 1$\frac{3}{7}$ per cent. The previous year's final was equivalent to 5 per cent. on the present capital. A capital distribution of 3d. per £1 unit was also paid on the smaller capital for 1958-59.

J. SAMUEL WHITE & COMPANY, LIMITED, shipbuilders, marine engineers, and boilermakers, etc., of Cowes, Isle of Wight—Dividend for the year ended September 30, 1959, is being raised to 22½ (20) per cent. with a final of 17½ (15) per cent. Group trading surplus increased to £350,177 (£263,112), tax was £171,884 (£147,878), and the net profit is £180,521 (£118,962).

LILLESHALL COMPANY, LIMITED, structural engineers, manufacturers of bricks, tiles, and concrete products, etc., of St. Georges, near Oakengates (Salop)—Share-

holders have been circularized by Mr. S. E. Scammell, who says that after the chairman, his family is the largest shareholder. He suggests that other holders may wish to support his view that proposals for a merger or sale of the business on the basis of net tangible assets should now be not merely considered if received, but actually sought. He proposes that fixed assets should be revalued.

VACTRIC, LIMITED, electrical and mechanical engineers, of London, S.W.1—The interim payment for the year to end-March, 1960, is being raised to 15 per cent. (11¼ per cent. equivalent) on the capital as increased by a one-for-nine scrip issue. A final of 25 per cent. was paid on the present capital for 1958-59. Group profit, before tax, for the half-year to September 26 last was £224,000 (£230,000). Group profit for the year to March 28, 1959, was £354,429.

E. H. BENTALL & COMPANY, LIMITED, agricultural engineers and ironfounders, etc., of Maldon (Essex)—A dividend for the year to March 31, 1960, of not less than 10 (same) per cent. is foreshadowed by the directors on the existing £146,230 ordinary. They also anticipate being able to pay a total of not less than 10 per cent. for 1960-61 on the capital as doubled by the rights issue, at par, now being made. An interim will be paid in about November. Net proceeds of the issue—about £140,230—will be used to reduce the overdraft.

ELLIOTT-AUTOMATION, LIMITED—Subject to certain consents required by the vendor, the company has bought for cash the nucleonic instrumentation business of Isotope Developments, Limited, including its laboratories and works at Beenham, near Aldermaston (Berks). Elliotts is acquiring the name and goodwill of the Isotope Development Company, but not the business of its subsidiary, R. A. Stephen & Company, Limited. The merger will become effective on February 5, subject to approval of members and stockholders of Isotope Developments, which will change its name to Nuclear Investments, Limited.

FREDERICK BRABY & COMPANY, LIMITED, structural engineers, sheet-metal workers, etc., of London, N.W.1—A heavy fall in the requirements of industrial firms had a very depressing effect on the company's sales in the year ended September 30, 1959, states the chairman, Mr. F. C. Braby. The roofing department has been fully employed and work has now started on Coventry Cathedral. Of the future, members are told that it looks as though demand for fabricated work in plate and sheet will gradually improve and current demand for building products is likely to continue throughout the year. The company's Euston Road, London, premises have been sold at a price considerably in excess of the book value.

RICHARD THOMAS & BALDWINS, LIMITED—Group manufacturing and trading profits increased by £2,150,552 to £10,181,220 in the year to October 3, 1959. With the inclusion of investment income and after providing for depreciation and tax, the balance was £4,122,085 (£3,014,037). A final dividend of 9 per cent. maintains the total at 13½ per cent. The net profit after adding taxation provisions for prior periods no longer required and deducting terminal expenses on the closing of old-type works was £4,242,085 (£3,634,468). Of this £252,813 (£5,674) was left with subsidiaries, leaving a net profit available to the parent company of £3,989,272 (£3,628,794).

LEY'S FOUNDRIES & ENGINEERING, LIMITED—Expansion plans for the motor industry will eventually result in an increased potential demand for the products of Ley's Malleable Castings Company, Limited, state the directors. It has been estimated that £1,800,000 will have to be spent during the next three years on plant and other fixed assets by the subsidiaries in carrying out the expansion and modernization programme. Negotiations have been entered into for the acquisition of a company carrying on a business complementary to that of one of the subsidiaries. If the negotiations are successful a substantial part of the British Government stocks held by the company will be realized to provide the necessary funds.

Birlec's Contract for Continuous Pusher Furnaces

TWO continuous pusher furnaces for annealing malleable iron, one for whiteheart and the other for blackheart castings, are being built by AEI-Birlec, Limited, Birmingham. The former, which employs a well-known Birlec patent process, will be the first continuous furnace in the country to be used for the gaseous annealing of whiteheart malleable castings. It is to be rated at 250 kW to give an output of 100 tons of castings per month. The second unit, for annealing 50 tons per week of ferritic blackheart malleable castings, will be rated at 390 kW.

In connection with contracts placed for the construction of a new oil refinery in Brazil for Petrobras Duque de Caxias, Birlec is to supply, through Brefcon, Limited, two absorption dryers and an inert gas generator of 15,000 c.f.h. capacity. The dryers are to be used for drying 50 (US) gallons per minute and 100 (US) gallons per minute, respectively, of liquified petroleum gas.

The plant is being built to the specification of Foster Wheeler Corporation, the design, engineering, and construction contractors for the new refinery.

Towards Meeting New Zealand's Steel Needs

NEW ZEALAND will be producing a substantial part of its steel needs in reinforcing rods, angles, and engineering rounds, flats, and squares by the end of 1961, said Mr. Philip Holloway, Industries and Commerce Minister, recently. He was announcing details of a £3,600,000 merchant bar mill at Auckland. New Zealand interests will hold the majority of the ordinary shares, but UK steel firms and financial interests are expected to invest in share and debenture capital.

The Minister said the Government had assured firms sponsoring the scheme that action would be taken to protect the mill from competition by dumped or unfairly-priced products, particularly if oversea companies or countries decided to change radically their present policies towards the New Zealand market. There would also probably be an embargo on the export of ferrous scrap suitable for the mill, he added.

SPEAKERS AT A one-day export sales conference, organized by the British Electrical and Allied Manufacturers Association, to be held in London on February 10 will include Mr. Reginald Maudling, President of the Board of Trade, Mr. Stanley Broughton, managing director of Electrolux, Limited, who will preside, Sir Leslie Gamage, president of BEAMA, who is chairman and managing director of the General Electric Company, Limited, and Viscount Chandos, chairman of Associated Electrical Industries, Limited.

IRON AND STEEL TRADE

THE steel boom has not caught the industry unprepared. It is now manifest that the expansion of demand has been given a further impetus by a general movement among consumers and merchants to replenish their stocks, but steelmakers have promptly risen to the height of their opportunities and deliveries are generally keeping abreast of increased industrial requirements.

Pig-iron

The most impressive evidence of the advances achieved in the technique of pig-iron production is provided by the official statistics of the average number of blast furnaces in operation during the past three years. In 1957 the number was 98, in the following year there was a drop of 10, and a similar decline last year. Only in part is this due to the substitution of new and bigger blast furnaces.

The yield of nearly every unit has been increased, but the continuing rise in steel production already indicates the need also for the early increase in the number of operative blast furnaces.

Ferro-alloys

Business in most items continues at a good level. Ferro-silicon is a very well supported feature. Both the low- and high-carbon grades of ferro-chrome are in fair request, and ferro-manganese and silico manganese are in good demand. The call on ferro-phosphorus and ferro-sulphide is maintained by certain customers. Calcium silicide is fairly active, while ferro-niobium and ferro-titanium are in moderate demand.

There has been a further increase in the price of ferro-tungsten, which now stands at 12s. per lb. W contained. Tungsten metal powder is similarly increased to 15s. per lb. The slight increase in the demand for ferro-tungsten is maintained. There is a steady request for supplies of ferro-molybdenum and ferro-vanadium.

Semi-finished Steel

Trading in all classes of steel semis has attained highly satisfactory proportions. With increased capacity at their disposal, British steelmakers are meeting the heavier requirements of the re-rolling industry, and the very large imports of semis from western Europe have shrunk to almost negligible proportions.

There are complaints from some establishments of a shortage of billets, but there do not appear to have been any serious difficulties on that account.

Finished Steel

The changing pattern of demand for various types of steel products which has long been a constant feature of the market is clearly defined in an analysis of deliveries in the past few months. Supplies to the durable consumer goods industries have risen very considerably, whereas there has been a heavy fall in the requirements for the railways, mining, and shipbuilding industries.

A pick-up in the call for plates—not yet very pronounced—has prompted the South Durham Steel & Iron Company to bring forward the date of the first rollings of its new plate mill to November next; and orders for heavy constructional material have risen very considerably and continue to expand. Demand for sheet steel is very heavy and shortages are foreseen for some time to come.

US Contract Award Provokes British Protest

PROTEST against the bid of a US company for eight hydro-turbines for the Glen Canyon dam in Arizona has been lodged with the United States Bureau of Reclamation by the English Electric Company, Limited. A spokesman for English Electric has confirmed a report in the magazine Business Week that the company had protested on the grounds that the US company might not be qualified as a domestic producer under the definition of the Buy American Act, because more than 50 per cent. of the proposed work on the turbines would be performed by a Belgian company.

The magazine reported that English Electric was the low bidder with $6,214,550 (about £2,255,000) for the contract when bidding was held early in December. Baldwin-Lima-Hamilton Corporation was second with a bid of $6,392,000 (£2,283,000) and was in a position to win the award since the 6 per cent. differential accorded to American producers under the Act in effect added £372,824 to the British bid.

The Act says a company may qualify as "domestic" as long as at least 50 per cent. of the work is performed in the US. Baldwin-Lima-Hamilton claims it has met this criterion as only 42.7 per cent. of the proposed work on the turbines would be by the Soc. Anon. Cockerill-Ougrée, Seraing, near Liège. The remaining 57.3 per cent. would be supplied from its own plant and by the Chicago Bridge and Iron Works.

Industrial Grants to University of Wales

A NUMBER of new donations have been made to the appeal fund of the University of Wales. The Mond Nickel Company, Limited, has provided £20,000 under a seven-year covenant earmarked for the parts of the applied sciences building allocated to metallurgy and chemical engineering. Imperial Chemical Industries, Limited, is to pay £14,000 in seven annual instalments to be used for the chemical engineering and mechanical engineering sections of the applied sciences building. The Electricity Supply Research Council has made a special grant of £7,000 for apparatus for research in the Physics Department. An annual grant of £2,300 for recurring expenditure is already being made by the council.

These new grants are in addition to a gift of £100,000 to be paid in 10 annual instalments, by the Steel Company of Wales, Limited.

AS FROM MONDAY all applications and inquiries relating to import licensing should be addressed to the Board of Trade, Tariff and Import Policy Division, Horse Guards Avenue, London, S.W.1 (telephone: TRAfalgar 8855).

Coal Stocks and Output

STATISTICS issued by the Ministry of Power do not yet reflect the lifting of coal stocks on the ground and in wagons reported from a number of areas this week. In fact, undistributed stocks rose slightly to 36,011,000 tons and stocks held by the public services, industry, and merchants dropped over 300,000 tons to 14,037,000 tons. Total coal consumption at 4,408,000 tons, though 200,000 tons less than a year ago, was well above production—4,023,000 tons—for the week ended January 9.

Deep-mined output last week improved by 70,000 tons on the previous week and open-cast output was also up by nearly 5,000 tons, but the total was just over 5 per cent. less than a year ago. The year has started with deep-mined output 4 per cent. less and open-cast 30 per cent. less than in the comparable period of 1959.

Since the beginning of the year the National Coal Board has changed the basis of its statistics of colliery manpower and productivity. In the following figures the number of wage-earners on colliery books now relates only to NCB mines, excluding the 6,300 (3,900 of whom are faceworkers) employed at licensed mines. In calculating output per manshift only NCB "revenue" output and manshifts are taken into account, licensed mines and NCB "capital" working being excluded. The figures for 1959 are adjusted to the new basis.

There were 633,100 wage-earners on colliery books on January 9, against 681,200 on January 10, 1959, the numbers engaged at the coal face being 242,900 and 266,100, respectively. Total absenteeism (all workers) in the week ended January 9, was 14.86 per cent., compared with 14.44 per cent. in the week ended January 10, 1959. Output at the face was 3.818 tons and overall 1.363 in the week ended January 9, compared with 3.583 and 1.320 in the week ended January 10, 1959.

The following table gives (in' tons) the output of saleable mined coal by division in the week ended January 16, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended January 16, 1960.		Week ended January 17, 1959.
	Total output.	Tonnage lost.	Total output.
Scottish	375,900	3,500	387,500
Northern (N & C) ..	249,000	—	261,800
Durham	467,400	—	475,600
North-Eastern ..	857,900	15,800	895,600
North-Western ..	272,600	3,100	293,200
East Midlands ..	915,900	200	925,300
West Midlands ..	302,300	700	325,900
South-Western ..	417,500	2,300	434,300
South-Eastern ..	30,400	—	34,500
Great Britain—			
Deep-mined coal..	3,888,900	25,600	4,033,700
Other deep-mined (including licensed mines) ..	50,400	—	52,400
Open-cast coal ..	158,800	—	237,800
TOTAL ..	4,098,100	25,600	4,323,900

DURING THE seven weeks to December 18, the amount of steel carried by British Railways from the principal steelworks totalled 1,433,000 tons, an increase of 285,000 tons, or nearly 25 per cent., compared with the corresponding period of 1958.

West Germany Reverses Coal Output Decline

REVERSAL of the downward trend in coal output in West Germany in 1959 is reported for the opening weeks of 1960. Hard coal production has risen to 3,307,800 metric tons, compared with 1,871,200 tons a year ago, and coke to 702,600 (679,600) tons. Last year's total coal output was 7,000,000 tons down on the 1958 figure. The decline in 1959 was less pronounced in the Saar, where output in 1959 dropped by only 100,000 tons to 16,100,000 tons. Coal and coke stocks rose over the year by 500,000 tons to 1,900,000 tons.

As a result of recommendations from both the Belgian Government and the High Authority of the ECSC five coal-mining companies in the Borinage coalfield have decided to form a consortium to be known as Soc. Anon. des Charbonnages du Borinage. It will have an annual output of some 2,000,000 tons.

Capital of the new consortium will be 600,000,000 Belgian francs and member companies will be:—Charbonnages de Hainaut, Charbonnages Unis de l'Ouest de Mows, Charbonnages du Levant et de Pro-Coeut et de la Boule Réunis, and Charbonnages Belges et de Hornu et Wasmes (a member of the Cockerill-Ougrée group).

Despite the European coal crisis, French output last year fell by only 0.4 per cent. on the 1958 record total. French coal authorities state that present levels will be maintained until 1965.

PARADOXICAL POSITION IN NOTTS COALFIELD

BECAUSE of the shortage of manpower in the Nottinghamshire coalfield of the NCB's East Midlands Division, miners have had to be withdrawn from the coal face to do other essential jobs to keep the pits operating. At the same time there is redundancy among Scottish and Welsh miners. This "paradoxical position" was referred to by Mr. Albert Martin, secretary of the Nottinghamshire Area of the NUM, following a meeting of the Area council on Saturday. He questioned whether the NCB's policy of restricted recruitment had been well-advised in the long term.

In planning for the future the Coal Board was placing more and more dependence on the Nottinghamshire Area where two new pits were being sunk and additional seams were being prepared at existing collieries. Bringing men in from other Areas would raise the problem of housing and the Area NUM president, Mr. Jack Tighe, said that if present trends were maintained 1,350 more men would be needed by the end of June in one Area alone.

Miners at Renishaw Park Colliery, near Sheffield, met on Sunday to hear further details of the NCB plan which will involve the transfer of about 160 of them to other pits in the East Midlands Division. The board has suggested that transfers should take place to High Moor, Oxcroft, Bolsover, Whitwell, Creswell, and Langwith collieries.

WITH EFFECT from February 8, the telephone number of the Erith (Kent) Works of the power cables division of British Insulated Callender's Cables, Limited, will be Erith 33030.

THE COAL TRADE

COLD weather in all parts of the country has kept the domestic fuel trade fully occupied, and many merchants are, in fact, having to keep their customers waiting for lengthy periods before delivery can be made. Deliveries have, of course, been restricted by the wintry conditions. Industrial supplies have also been held up, but most of the large users have fair stocks on hand.

SCOTLAND

Glasgow—The first real spell of wintry weather this year brought snow to almost every part of the country and resulted in a more animated trade in all sections of the market. Fortunately, the snow was not accompanied by severe frost so that stock could be lifted easily and distribution proceeds without much difficulty.

A good demand is experienced for house coal, and although operations go smoothly at the pits providing full supplies of fresh wrought coal, these are insufficient to meet all demands and sizeable withdrawals have been made from merchants' stock, reducing it by about 10 per cent. below last year's level. The Divisional Coal Board holds a substantial tonnage of doubles and a prolonged period of cold weather will find these invaluable in meeting the inevitable shortage of large coal. In anticipation, the board has been advertising doubles for domestic purposes and a good business is passing for these in packaged forms.

Complaints of poor value in house coal are being received from customers and the trade's reputation is suffering. Selling "out-of-grade," although technically no offence, may well compel people to change to oil, with its consistency of quality.

Anthracite nuts are a brisk trade and large, too, is busy as demands for heating glasshouses increase. Low-volatile duff continues to find a good outlet in the export market. Sales of hard coke nuts, gas coke, and manufactured fuels improve.

In the industrials section, supplies of all grades are adequate, with the exception of singles. A much improved business is passing in coking smalls. Metallurgical coke requirements are comfortably met.

Fife and Lothians—Trade in house coal developed strongly as wintry conditions struck the eastern part of the country. The industrial sector is busy, with singles in particularly keen demand. Exports got off to a better start in 1960 than last year, but the volume of business is still well below the average.

US Steel Mills Aim at 12,000,000-ton January Output

STEEL mills in the United States aim to make January the first month in history in which production has topped the 12,000,000-ton mark. With only just over half of the month gone the industry had turned out 6,600,000 tons of raw metal. According to schedules in the major steel centres, this week's output would rise slightly from the national estimate of 95.3 per cent. of rated capacity for the week ended January 17.

A preliminary estimate by the American Iron and Steel Institute shows that a record total of 11,980,000 net tons of ingots and steel for castings was produced in December, which was the fourth month of 1959 in which 11,000,000 tons or more was produced. Production for the full year totalled 93,436,813 tons, over 8,000,000 tons more than in 1958.

Law Cases

NCB STRAINS JUDGE'S CREDULITY

DAMAGES amounting to £1,404 were awarded at Newcastle-upon-Tyne Assizes to Mr. Robert Peel (50) for injuries received while working on a National Coal Board wagon-loading chute. Giving judgment Mr. Justice Salmon commented on the fact that two people had previously been injured by stones flying from the chute. Nothing, however, had been done to stop these mishaps. Eventually Mr. Peel had received spinal injuries from a stone from the chute which had struck him in the back. He was now able to do only light work.

The judge said he did not accept the Coal Board submission that the accident was due to plaintiff's carelessness. He referred to the fact that the NCB had now made alterations to the chute and added that the Coal Board's statement that this had not been done because of the accident put a strain on his credulity.

IN EDINBURGH COURT OF SESSION Mr. George Arthur Smith was awarded £850 damages against the Burntisland Shipbuilding Company, Limited, Burntisland (Fife). He claimed when he was at work as a plater on a ship under construction his foot caught on a washer welded to the deck.

AGREED DAMAGES of £200 and costs were awarded by Judge O. Temple Morris at Newport County Court to Mr. James Samuel Bell, a chargehand fitter at the Orb Works (Newport) of the Steel Company of Wales, Limited. Mr. Bell, who was involved in an accident at the works, submitted that the company had been negligent.

ROBERT JOHNSON (41), a former miner at Stargate Colliery, Ryton (Co. Durham), was fined £10 by Blaydon magistrates for smuggling a tin box containing cigarettes and matches into the pit. It was stated that Johnson was caught by two officials who made an underground search of workers. The defendant said he had lost his job as a result of the offence.

Miners Make New Claims on Coal Board

MINERS' leaders, meeting in London yesterday (Thursday), decided to put to the National Coal Board a claim for an increase of 12s. a week for 300,000 day-wage men. This was 2s. a week more than had been expected in many quarters.

The miners are also to press the NCB to agree that a claim for a seven-hour day for underground workers and a 40-hour week for surface men should go to the industry's arbitration tribunal.

Non-ferrous Metals

London Market Reflects US Copper Dispute

NEITHER Phelps Dodge nor Anaconda have yet come to terms with the Mine, Mill and Smelters' Union, so that a great deal of US copper production capacity is still strikebound. This position has aggravated the shortage of physical copper and, in particular, of metal for early delivery.

The London market is reflecting this situation and both the cash and three months' quotations are going ahead steadily.

Indeed, demand is good both from the UK and from the Continent and is concentrated on cash metal, so that the backwardation has gone out from £7 to over £13 a ton. Unless the US strike is settled this disparity will increase. The outlook is still dominated by the US situation and prices will either rise or be held in check depending on the prospects of an early overall settlement. The US price structure is unchanged, with custom smelters quoting 35 cents and producers 33 cents a pound.

Tin is a relatively firm market in London. This market was helped last week by figures published in the International Tin Council's Statistical Bulletin, which showed that consumption of primary metal in September reached 13,000 tons, compared with 11,200 tons in August. The good September figures were aided by a recovery in consumption in the UK, France, and, in particular, Federal Germany. The crucial point about the statistics is that US consumption in September remained at the same low level as in August, reflecting the strike in the US steel industry. Now that the steelmen have returned to work the outlook for tin must be considered bright. Indeed, it is now thought that the council had the above figures in mind when it raised the export quotas for the first quarter of this year by as much as it did. In the US demand is improving, but the price has yet to go above $1.00 a pound.

Lead is a good market in London and the cash price is around £74 a ton. Demand is satisfactory and the undertone is firm. The outlook continues good, but further rises in the quotation may well depend on how much scrap can now be coaxed on to the market. Demand in the US is satisfactory and the price is unchanged at 12 cents a pound.

Zinc continues firm on both sides of the Atlantic. Demand has been good for many months and, with the US steel industry getting back into its stride and car sales buoyant, the outlook is bright enough to suggest a further price rise in the not too distant future if the present level of demand continues.

The US zinc price remains firm at 13 cents a pound, East St. Louis.

The US Tariff Commission has rejected an application from American industry to raise tariffs or place quotas on imports of coated or plated zinc. These sheets are supplied to the US from the UK, France, West Germany, Belgium, Holland, Yugoslavia, and Canada.

Official metal prices in London yesterday (Thursday) were:—COPPER, Standard: Prompt £260 10s., forward £247. TIN, Standard: Prompt £792 10s., forward £790 10s. LEAD: Prompt £74 5s., forward £74 7s. 6d. ZINC: Prompt £93 15s., forward £92 5s.

Obituary

The death took place last Friday of Mr. ROBERT A. WILSON, who was formerly with the Expanded Metal Company, Limited, London, S.W.1.

Director and works manager of Thomas Robinson & Son, Limited, woodworking and flour provender milling engineers, of Rochdale, Mr. JAMES BUCKLEY, died on Monday.

The death has occurred of Mr. HERBERT S. MURRAY, who was chairman of the Scottish section of the Institute of Metals and managing director of a firm of Edinburgh electroplaters. He was over 70.

Mr. C. SHERWOOD, a former manager of the dockyard of William Gray & Company, Limited, shipbuilders and dry dock owners, etc., of West Hartlepool, has died. He retired in 1952 after 49 years with the company.

Major-Gen. F. J. DUNCAN, who died on Thursday of last week at the age of 89, joined Imperial Chemical Industries, Limited, in 1924 after a distinguished military career and served as under-secretary, secretary to the chairman, and executive in charge of staff.

Mr. WILLIAM HENRY JONES, who has died at the age of 72, was chairman and senior director of Edwards & Jones, Limited, manufacturers of pottery and bakery machinery, of Stoke-on-Trent. He had spent all his working life with the firm, which was founded by his father in 1880.

Mr. NORVAL M. LINDSAY, a former director of Barclay, Curle & Company, Limited, ship builders and repairers, etc., of Glasgow, died last Friday. He joined the company in 1914 as chief accountant and became secretary in 1942. He was appointed to the board in 1951 and retired some three years ago. He was a member of the council of the Institution of Engineers and Shipbuilders in Scotland.

Mr. THOMAS HAMILTON, a former director of Fleming & Ferguson, Limited, shipbuilders and marine engineers, of Paisley, has died at the age of 75. He was an authority on dredger design and served his time as an engineer with Lobnitz & Company, Limited, Renfrew. He joined the Paisley firm in 1939 as engineering manager, becoming assistant general manager and later a director. He retired a few years ago because of ill health.

Capt. W. H. REES, who died on Sunday at the age of 67, was first manager of the Cefn Coad Colliery, Crynant (Glam), where he had charge in 1926 of the sinking of the pit, at the time the deepest anthracite mine in the world. He was afterwards agent for the Vale of Neath group of Amalgamated Anthracite Company, Limited. A member of the council of the South Wales branch of National Association of Colliery Managers, Capt. Rees was also a member of the South Wales Institute of Engineers.

The funeral took place on Thursday of last week of Mr. DAVID JOHN MORRIS, who was well known in civil and mining engineering circles in South Wales. He joined Morgan, Davies & Partners, civil and mining engineers, of Swansea, on leaving school and after service in the first world war and some years in India he returned to the firm as a partner with Mr. Ivor Evans. During the last war he was a member of the Coal Commission and subsequently became an estates manager with the National Coal Board. He retired in 1952.

PORTLAND CEMENT deliveries in the UK reached a record level in 1959, according to the Cement Makers' Federation. The total of 11,600,000 tons was 1,000,000 tons greater than the 1958 total and exceeded the previous record, set up in 1957, by 370,000 tons.

Personal

Honour for Former NCB Deputy Chairman

THE Queen's University of Belfast is to confer the honorary degree of LL.D. on Sir WALTER DRUMMOND, a deputy chairman of Geo. Angus & Company, Limited, manufacturers of oil seals and power-transmission engineers, Newcastle - upon - Tyne, at graduation ceremonies in July. Sir Walter, who is also a director of Sigmund Pumps, Limited, and Smiths Dock Company, Limited, was deputy chairman of the National Coal Board from 1951 to 1955.

SIR WALTER DRUMMOND

Before beginning a long association with the Ashington Coal Company, Limited, Sir Walter was a pupil with Harland & Wolff, Limited, Belfast, and then for some time with Sir W. G. Armstrong Whitworth & Company, Limited. He was, successively, chief engineer, general works manager, and managing director of the Ashington company. Upon nationalization, Sir Walter was appointed deputy chairman of the North-Western Divisional Coal Board. He is a member of the council of the Department of Scientific and Industrial Research and chairman of the council of King's College, University of Durham.

Mr. F. FRANKS, managing director of the Furnival Steel Company, Limited, and Geo. Robson & Company (Conveyors), Limited, both of Sheffield, sails for Argentina today (Friday) on a business trip.

Mr. RAY WILLIAMS, manager of Ifton Colliery (Denbighshire) has received a presentation from the mining officials at the colliery on leaving to take up the post of manager of Hafod Colliery (Denbighshire).

Sir GORDON RUSSELL has been appointed a member of the Council of Industrial Design following his retirement as director. He was an original member of the council in 1944 and became a director in 1947.

Mr. ANDREW CAIRNS, manager of Frances Colliery, Dysart (Fife), for the past seven and a half years, who is leaving to become manager of Michael Colliery (Fife), has been presented with a gold wrist watch by the Frances Social Club.

Major LANGTON HIGHTON, managing director of the Workington Iron & Steel Company (branch of the United Steel Companies, Limited) for 20 years until he retired two years ago, has been appointed a Deputy Lieutenant for the county of Cumberland.

Mr. JOSEPH SOWERBY, who is 87, has received a presentation to mark his retirement after 23 years as a trustee of the Yorkshire Winding Enginemen's Association. He joined the association in 1920 and for 30 years was treasurer of the Barnsley branch.

Mr. F. H. HEINE has retired as vice-president, foreign operations, of the Koehring Company, Milwaukee, USA, and his duties have been taken over by Mr. ED SMITH. The company has had a long association with the excavator division of Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield.

Mr. ARTHUR CLARKE, senior assistant in the cost department of the No. 2 (Doncaster) Area of the North-Eastern Divisional Coal Board, is retiring after some 53 years in the coal industry. He came to the Doncaster Area in 1913 and worked at Bullcroft Colliery until 1937. Before joining the NCB he was with Doncaster Amalgamated Collieries, Limited.

Mr. DAVID ANDERSON, former manager of Minto Colliery, Lochgelly (Fife), was the guest of honour at a presentation social held in Balcomie Links Hotel, Crail (Fife), which he has taken over. Workmen and officials from the colliery travelled there by special bus and Mr. James Glancy, undermanager of No. 2 Pit, presented Mr. Anderson with a tape recorder.

Mr. EDWARD SPARROW, who retired at the end of 1959 as works personnel manager of Ransomes & Rapier, Limited, engineers and ironfounders, of Ipswich, has received a presentation from the joint managing director, Admiral R. S. Warne, on behalf of the workpeople and staff. He has also received a number of presentations from various departments. Mr. Sparrow spent 51 years with Ransomes & Rapier.

Among those appointed to a committee set up by the Institute of Directors to examine the duties and responsibilities of directors are Mr. HARALD PEAKE, chairman of the Steel Company of Wales, Limited, Sir HALFORD REDDISH, chairman of the Rugby Portland Cement Company, Limited, Lord WEEKS, chairman of the Finance Corporation for Industry, Limited, and Mr. ALFRED READ, a director of Powell Duffryn, Limited.

Recent visit of Mr. P. J. C. BOVILL to the Waterside Works, Ipswich, of Ransomes & Rapier, Limited, in his capacity as Master Cutler was the first occasion on which a Master and Mistress Cutler had visited Ipswich, although the Master Cutler attends the annual Oyster Feast at Colchester, some 18 miles away.

MR. P. J. C. BOVILL

Mr. Bovill, who is managing director of Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, is also, of course, a director of the Ipswich firm. Mr. and Mrs. Bovill were accompanied on their visit by the joint managing directors, Mr. S. C. TYRRELL and Admiral R. S. WARNE, and Mr. G. N. RODGERS, secretary of Ransomes & Rapier. After a lengthy tour of the works the party were the guests at a specially convened meeting of the Ransomes & Rapier Works Industrial Council, a body representative of all sections and activities at the Waterside Works.

Mr. EDWIN WAINWRIGHT, MP for Dearne Valley (Yorks), has received a presentation from Mr. Jim Davies, branch delegate of the Darfield Main branch

of the NUM, on behalf of Darfield Main Colliery employees, in recognition of his work as branch secretary for the past 11 years. He began work at Darfield Main at the age of 14, became a branch committee member in 1934, and was a delegate for nine years before becoming secretary.

Five officials who have given 215 years' collective service to the Motherwell Bridge & Engineering Company, Limited, Motherwell, have just retired. They are Mr. JAMES SIMPSON, shipping manager (53 years' service), Mr. WILLIAM WALKER, works foreman (57 years), Mr. WILLIAM CRAIG, works foreman (47 years), Mr. THOMAS BAILLIE, works foreman (35 years), and Mr. JAMES HUNTER, timekeeper (22 years). On behalf of the workers, Mr. A. R. Miller, managing director, made a number of presentations.

Included in the recently-announced Advisory Council on the Employment of Prisoners are the following full members:—Mr. J. A. CRABTREE, managing director of J. A. Crabtree & Company, Limited, manufacturers of switchgear and protective control gear, etc., of Walsall (Staffs); Mr. J. MARSH, director of the Industrial Welfare Society; Mr. W. D. SEYMOUR, Lecturer in the Department of Engineering Production, Birmingham University; Mr. W. N. TALLON, member of the executive committee of the Amalgamated Engineering Union, and Mr. B. A. WILLIAMS, chairman of Williams & Williams, Limited, manufacturers of metal windows and doors, etc., of Chester.

Mr. S. R. WILKINS, who was recently appointed managing director of Avo, Limited, London, S.W.1, a Metal Industries, Limited, subsidiary making electrical measuring instruments, etc., has received a presentation to mark his 25 years' service with the company. Long-service presentations were also made to Mr. G. BEARMAN, chargehand, and Mr. J. COLLINS, assistant chief inspector. Mr. Wilkins joined Avo (then known as the Automatic Coil Winder & Electrical Equipment Company) in 1934 to develop electronic and special instruments. In 1940 he was appointed chief electronic engineer and manager of the electronic instrument section in charge of design and production. He was made technical director in 1956.

Industry Aids "War on Want" Exhibition

SEVERAL branches of British industry are supporting the "War on Want" international exhibition at the Central Hall, Westminster, this week. Sponsored by the "War on Want" Trust, which seeks to foster active and practical sympathy throughout Britain for the undeveloped areas of the world, the exhibition underlines the trust's belief that the needs of these areas for economic and social development can be adequately met only if the richer nations render aid on a far larger scale than they do at present.

Among the firms and organizations with stands at the exhibition are Unilever, the Blue Circle cement group, Dexion, Limited, Industrial and Process Engineering Consultants (Great Britain), Imperial Chemical Industries, Limited, the Anglo American Corporation of South Africa, Limited, the Cementation Company, Limited, and Hugh Wood & Company, Limited.

A large manufacturer of conveyors and related equipment, Hugh Wood & Company, draws attention to the possibilities of the conveyor in raising the standard of living in regions where short distance transport is left almost entirely to human muscle and endurance, aided, perhaps, by the efforts of draught animals.

Minister of Power's North-East Tour

COALFIELDS, National Coal Board plant, and important industrial centres in north-east England have been "on parade" this week for Mr. Richard Wood, Minister of Power. During his tour of Northumberland and Durham he has met members of the Northern (N&C) and Durham Divisional Coal Boards and had discussions with representatives of the NUM and other bodies.

Speaking at Newcastle-upon-Tyne on Wednesday, the Minister made it clear that oil-burning power stations could not be changed to coal-burning in order to consume stocks, nor could the long-term planning for nuclear power stations be altered.

The changeover to oil, he said, was made during a period of acute coal shortage; contracts were made with oil companies and these could not lightly be broken. Nuclear development, too, must take place irrespective of coal stocks.

Mr. Wood said he would be opposed to any cut in the long-term energy programme. Although coal was a more economic fuel at present they would be making it quite impossible for concerns building the power stations to get any practical knowledge about the application of nuclear power in Britain. "By the turn of the century we should be putting ourselves very seriously behind our industrial competitors in the world."

He went on to say that he had already increased the borrowing power of the NCB to cover the cost of stockpiling and he would not agree to cut-price selling to get rid of stocks. "We would probably sell a bit more, but it would be at the expense of current production which would only go to take its place—and there's no future in that."

The Minister, however, left no one in doubt as to his confidence in the coal industry. It had a great future, but the pattern of development might be different from that of the past. Some miners were obviously worried that their jobs might be in danger. The Coal Board believed that it had "turned the corner" and he himself felt that any young man would find an excellent future in the industry.

His inspection of the NCB coal staiths and shipping arrangements at Blyth (Northumberland) on Tuesday was carried out by launch and he also saw some of the reconstruction work at Bates Colliery, near Blyth, to exploit undersea coal reserves of 28,000,000 tons.

Earlier on Tuesday he had had explained to him the main points in the £2,500,000 reconstruction scheme which is being undertaken at the Rising Sun Colliery, near Wallsend-on-Tyne. He was accompanied by Mr. Leslie Graham, chairman of the Northern (N&C) Divisional Coal Board, and Mr. E. W. Potts, Area general manager, No. 1 Area, of the division, and was received by Mr. S. Peart, manager of the Rising Sun Colliery.

At the NCB's Central Area Workshops at Ashington Colliery, which were also in the Minister's itinerary for Tuesday, he saw one of the most modern, well-designed and efficient engineering layouts in the north-east. Mr. S. T. Smith, workshops manager, Mr. A. Tennick, workshops superintendent, and Mr. J. R. Ruggan, chief inspector, met the official party.

On Wednesday Mr. Wood visited Blackburn Fell Drift, Morrison Busty training centre, and Beamish Mary Colliery, and his programme for yesterday (Thursday) included a visit to the Lackenby steelworks of Dorman, Long (Steel), Limited, and an underground inspection of Easington Colliery.

Coalfield News

Gold Standard for Young Scottish Miner

FIRST miner in Britain to win the Gold Standard of the Duke of Edinburgh's Award Scheme is 18-year-old Mr. William Muir, an underground worker at Glenochil Colliery, near Alva (Clackmannanshire). He is also the first person in Scottish industry to qualify for the award. In appreciation of his achievement Mr. William Summers, Area general manager of the Alloa Area, Scottish Divisional Coal Board, on behalf of the board presented Mr. Muir with a book and a monogrammed wallet at the NCB's training centre at Sauchie last week.

Mr. Muir, who is a keen amateur footballer, equalled or surpassed all the standards set for the award. His father and brother also work at Glenochil.

EXTENSIVE SITE CLEARANCE at Brodsworth Main Colliery, near Doncaster, is to be undertaken to provide more space for miners' cars. As a result of modernization, the colliery is taking on more men.

FEBRUARY ISSUE of Mining Review is the 150th edition of the NCB's popular monthly newsreel, which, in addition to being screened at cinemas in coalfield districts, is also shown at some West End theatres.

THE 700 MINERS who came out on strike on Wednesday of last week at Point of Ayr Colliery (Flintshire) because the management planned to take away the colliery ambulance returned to work at the beginning of this week.

ALLEGING THAT there were insufficient safety precautions, miners at Solway Colliery, Workington (Cumberland), went on strike on Wednesday afternoon. A pithead meeting of the afternoon shift demanded to see a conveyor belt which had been partly burned during the night. The miners claimed that the damage had not been reported to them.

THE NCB HAS presented a collection of old deeds relating to lands near former collieries in the Yorkshire parish of Silkstone to the local history department of Sheffield Central Library. The deeds, which date from the reign of King James I, came to light recently in the offices of the South Barnsley Area of the North-Eastern Divisional Coal Board.

BECAUSE NEW JOBS will not be available this month for the men made redundant by the closure of the Collinburn section of Greenrigg Colliery (West Lothian) plans have been revised and the section will continue to operate until the end of February. The men were to have been absorbed at Overtown Colliery (Lanarkshire), but development work there is behind schedule.

SUBSTITUTION of coal heating for oil in the plans for a new hospital at Huddersfield has been decided upon by Leeds Regional Hospital Board. The decision was made because coal is a major Yorkshire industry and it is not considered that there is a great difference in running costs, and modern methods can ensure that atmospheric pollution from coal is no greater than from oil.

A REMARKABLE RECORD of family service to one pit was honoured recently when Mr. Alfred Lawrence Clamp (65), enginewright, retired after 48 years at Cadley Hill Colliery, Castle Gresley (Derbyshire), 30 of them in his last post. He succeeded his father, the late Mr. A. T. Clamp, who was 62 years at the pit and enginewright for 37. Mr. Alfred Clamp's son, Graham, has done 20 years at Cadley Hill and is now foreman fitter. A presentation was made to Mr. Clamp by the colliery manager, Mr. J. R. Gibson, who has seen over 100 such presentations during the course of his 18 years' managership at the colliery.

THE NEW CYNHEIDRE anthracite colliery, near Llanelly, has begun to absorb redundant miners from old collieries in the Gwendraeth Valley. Thirteen men have been transferred from Carway Colliery and 70 will follow shortly. Within two months the total Carway labour force of 220 will have been transferred. The Trimsaran Colliery washery will be closed shortly and the men moved to Cynheidre, which will ultimately employ 3,000 miners.

SHIPMENTS OF COAL AND COKE to home and foreign destinations from the South Wales ports last week totalled 60,976 tons, compared with 60,715 tons in the previous week and 55,416 tons in the corresponding week of 1959. Shipments from the various ports (with the comparable 1959 figures in parentheses) are as follow:—Newport, 12,657 (5,321) tons; Cardiff, 12,531 (7,305) tons; Penarth, 4,613 (5,548) tons; Barry, 13,833 (19,983) tons; Port Talbot, nil (1,657) tons; Swansea, 17,342 (15,602) tons.

Coal Research is "Quite Inadequate"

COMPARED with the effort devoted to nuclear energy, research and development of coal in this country is far too small, said Sir Harold Hartley, FRS, the former president of the World Power Conference, when he addressed the Fuel Luncheon Club in London on Monday. The present programme of research and development seemed to him to be "badly out of balance."

"Very large sums of money and a considerable fraction of our scientific effort are being devoted to the nuclear field, including thermonuclear fusion, in comparison with which the effort devoted to the better utilization of coal, our greatest national asset, and to the possibilities of the direct conversion of coal to electricity is quite inadequate," said Sir Harold.

There was no question that world reserves of coal were much greater than those of oil and natural gas and he thought that the present investment in British coalfields would pay a handsome dividend. Energy would be an essential factor in the success of the industrialized nations in helping the more backward countries to raise their standard of living. He could foresee a time when every source of energy would be needed and when, in the interest of conservation, each would be used for the purposes for which it was best suited.

RECOVERY IN TYNE IRON-ORE TRADE

AFTER imports of only 189,119 tons in the first six months of 1959, the Tyne iron-ore trade came to life and by the end of the year 946,358 tons had entered the port—173,439 tons more than in the previous year. No less than 757,239 tons of ore were handled in the second half of the year and in October the Tyne Improvement Commission's discharging plant at Tyne Dock handled 176,000 tons, so establishing a new monthly record.

The strong demand for steel is expected to help the Tyne's iron-ore imports to exceed the 1,000,000-ton mark in the current year and there is talk of imports approaching the 1956 record of nearly 1,400,000 tons.

Orders Placed

Consett Iron Leads World in New Steelmaking Project

NEW steelmaking plant to be installed by the Consett Iron Company, Limited, as part of its current development plan will be the first in the world to use both the L.D. and the Kaldo Oxygen steelmaking processes. The first British engineering company to receive orders for L.D. or Kaldo convertors is Head Wrightson Iron & Steel Works Engineering, Limited, a subsidiary of Head Wrightson & Company, Limited, Thornaby-on-Tees (Yorks), which is to build two 100-ton L.D. units and two 100-ton Kaldo units. The plant is expected to go into production at the end of 1961 and is designed to produce an additional annual output of about 750,000 tons. The value of this initial order is about £700,000.

The Consett Iron Company decided to adopt both processes to obtain effective cover for its range of products. Head Wrightson has, for some considerable time, been actively engaged in research and development work on oxygen steelmaking processes and the associated problems of gas cleaning. In connection with the former it is in association with Pintsch Bamag, AG, of Cologne, and on fume cleaning with Research Cottrell Inc., of the USA. The International Construction Company, Limited, London, W.C.2, is acting as consulting engineers for the project.

THE DOCKS DIVISION of the British Transport Commission has placed an order with Richard Dunston, Limited, Thorne (Yorks), for a twin-screw, diesel-electric suction dredger for Port Talbot.

A SOUTH AFRICAN order placed with W. H. Allen, Sons & Company, Limited, Bedford, is for a high-lift pumping plant for extensions to the Riverton pumping station of the Municipality of Kimberley.

A 10,000-TON MOTOR VESSEL to carry phosphate rock for A. & W. (Overseas Developments), Limited, a member of the Albright & Wilson, Limited, chemicals group, has been ordered from the Burntisland Shipbuilding Company, Limited, Burntisland (Fife). The contract was won in the face of competition from Germany, Holland, Denmark, and France.

A NEW POWER STATION to be built on the shore of Loch Ericht by the North of Scotland Hydro-Electric Board will be equipped with a 2,200-kW turbo-induction generator supplied by Bruce Peebles & Company, Limited, Edinburgh. The turbines for the station will be manufactured by the Armfield Hydraulic Engineering, Company, Limited, Ringwood (Hants).

THE RUSSIAN TRADE DELEGATION has placed an order worth £16,000 for 13 sets of gas-liquid chromatographic analysis apparatus with Griffin & George, Limited, Alperton, Wembley (Middx). The order is the result of demonstrations given to the delegation's scientific representatives at the company's laboratory at Alperton and at the Symposium of Micro Chemistry in Birmingham in 1959. It is the second order from the USSR during the last 12 months.

ONE OF TWO BERTH RESERVATIONS at the South Shields shipyard of John Readhead & Sons, Limited, which has been held for some time, is being taken up by the Stag Line, Limited, North Shields. A 10,350-ton d.w. bulk cargo carrier will be built and will be delivered in the spring of 1961. The second berth booking, however, will be given up. Propelling machinery for the new vessel will be supplied by the North Eastern Marine Engineering Company, Limited, Wallsend.

The Scrap Markets

Home Needs Come First

SUPPLIERS of iron and steel scrap are looking forward to a prosperous year. Exports are forbidden: that, of course, is an elementary precaution, since there is no doubt that every ton of home scrap will be needed for home consumption.

Prices have not been varied under a gentleman's agreement with the steelmakers, and merchants are working at full stretch to cover steelworks' increased requirements.

Cleveland—There is a very active demand from the steelfoundries for short heavy steel scrap. Blast furnaces are also taking up big tonnages of borings, turnings, and destructor scrap, while a much better demand is encountered for all grades of cast-iron scrap since the partial recovery of the trade in iron castings.

Lancashire—Busier conditions continue to be reported in most sections of the Lancashire iron and steel scrap markets. Foundries are absorbing increased quantities of machinery metal and other descriptions of cast scrap. Current business in these is less of a hand-to-mouth nature and there is a readier disposition on the part of consumers to add to their reserves.

The steel mills are also taking steady deliveries of steel-melting scrap. Supplies of textile machinery metal continue to come forward under the cotton trade reorganization scheme.

Scotland—The heavy steelmakers continue to press their suppliers for increased deliveries of all grades of steelmaking scrap. Tonnages are being maintained at a fairly high level, but there is scope for additional quantities. Production of steel turnings shows little variation and merchants are experiencing no difficulty in disposing of this grade provided it is free from bushy material and alloys. Output of cast-iron borings is also fairly satisfactory and regular consignments are being forwarded to the blast furnaces.

At present, business among the ironfoundries is very slow, although hopes are expressed that this year will show a marked improvement on 1959. So far, however, there has been little change in order-books, with the result that the call for cast-iron scrap remains quiet.

New Lee Wilson Engineering Company for Europe

A NEW corporation to co-ordinate sales and manufacturing facilities for the new open coil process of gas alloying and annealing in both the European Common Market and Free Trade Area has been formed by the Lee Wilson Engineering Company, Cleveland, US, and its European licensees. To be known as Lee Wilson Engineering Company, SA, its headquarters will be in Fribourg, Switzerland, and it will function through Heurtey in Belgium, France, and Italy, Ofag in Germany, and the Incandescent Heat Company, Limited, in Britain, in providing sales and engineering information and special mechanical coiling parts of the process.

The new office will be managed by Mr. Vincent J. Gibbons, formerly chief of the technical division of the Armco International Corporation in Europe. He was technical correspondent for Armco both before and after the war and from 1948 to 1955 was service engineer for its international division.

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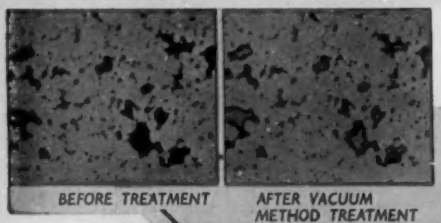

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Vacuum Impregnation has been so perfected that castings can be sealed within 48 hours.

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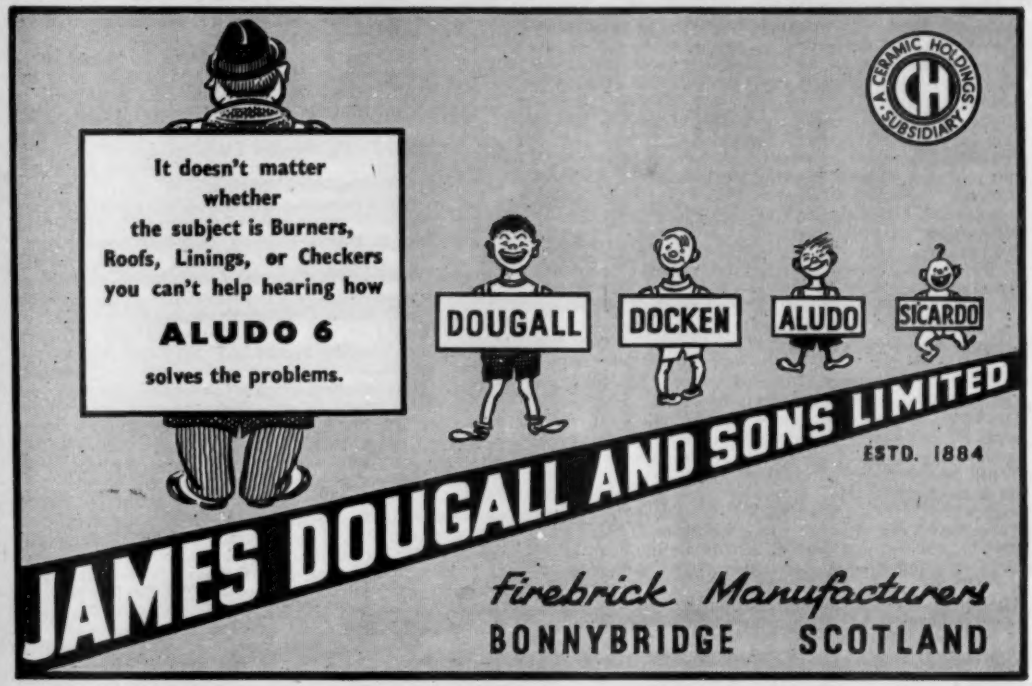

News in Brief

A TON OF wire rope ordered from British Ropes, Limited, Doncaster, last Friday was made on the same day and reached its destination at Ibadan, West Africa, 3,500 miles away on Tuesday—only five days later.

FOR THE SECOND TIME within the last five years British Insulated Callender's Cables, Limited, has extended its branch premises at Middlesbrough. Expansion has been necessitated by the progressive increase in business and the consequent need to carry a greater variety and quantity of stock.

A NEW OFFICE is being opened at Windsor Chambers, Bearwood Road, Smethwick, Birmingham 41 (telephone: Bearwood 2799), by Metalock (Britain), Limited, London, W.C.2, which carries out the "Metalock" process of repairs to fractured castings. In charge of the new office will be Mr. A. K. Hughes.

UNOFFICIAL STRIKE at the Birmingham factory of Hardy, Spicer, Limited, manufacturers of flexible and mechanical universal joint couplings, which started last Friday when a foreman was alleged to have used a swear word to a worker who arrived late, ended on Wednesday. Some 1,800 workers were affected.

PRODUCTION OF crude steel in Japan this year is expected to increase by 18 per cent. to 19,700,000 tons, according to a statement by the Japanese Iron and Steel Federation in Tokyo on Wednesday. Crude steel output in 1959 rose by 37 per cent. to 16,600,000 tons. Japan is now the fifth largest steel producing country.

THE RATEABLE VALUE of Que Que, Southern Rhodesia's growing steel centre, has increased by more than 50 per cent. in five years, according to the 1958-59 audited final accounts. At the end of last June the rateable value of the town was £2,294,715, compared with £1,527,935 at the same date five years previously.

TURNOVER IN 1959 of the big West German steel company, Rheinische Stahlwerke, was 4.6 per cent. down on 1958. There is not likely to be a commensurate drop in net profit as the poor results of the foundry and coal-mining sectors were more than outweighed by the results from the steel and metal processing sectors.

FURTHER DISCUSSION of the claims of the Confederation of Shipbuilding and Engineering Unions for a substantial increase in wages and the immediate introduction of a 40-hour working week will take place on Thursday when the unions meet the Shipbuilding Employers' Federation. The employers have already refused both claims.

REFLECTING THE GROWING competition from oil, coal output in the European Coal and Steel Community fell sharply in 1959—by 4.67 per cent. from 246,390,000 tons to 234,880,000 tons. The biggest percentage decline occurred in Belgium (15.93 per cent.) and the biggest quantity decline in West Germany (6,995,000 tons or 5.28 per cent.).

WORKSHOPS WHICH WERE destroyed by fire last October at the South Shields premises of the Middle Docks & Engineering Company, Limited, have been replaced by a new building containing joiners', carpenters', and riggers' shops which are expected to be in use by the end of the month. Work has also started on a new electricians' shop.

ONE OF GERMANY'S leading steelmakers, August Thyssen-Hütte, AG, is to raise its capital by DM 111,000,000 to DM 444,000,000 (about £37,000,000) by a one-for-three rights issue at 180 per cent. of par. The dividend for 1959 is raised to 10 (9) per cent. The company has an application before the ECSC High Authority for permission to acquire controlling interest in Phoenix-Rheinrohr, AG, another big German steel firm. The company announces that expert advice approves the share exchange on a one-for-one basis.

WORKERS AT FACTORIES in Manchester, Kilmarnock, Peterborough, and Coventry will benefit from the decision of Massey-Ferguson, Limited, the tractor and agricultural engineering concern, to introduce a 40-hour week and to pay higher wages at its British factories. The company's 12,000 workers will receive increases in pay ranging from 1d. to 4d. an hour.

PRODUCERS OF NEARLY 8 per cent. of West Germany's pig-iron output, Hüttenwerk Oberhausen, AG, proposes to raise its capital by DM 52,000,000 to DM 260,000,000 (about £21,750,000). It is aimed to raise both pig-iron and raw steel capacities to about 2,000,000 metric tons per year. During the last financial year turnover dropped by 7.2 per cent.

REPRESENTATIVES of local education and industry were present at the annual apprentice's prizegiving and exhibition of work of George Kent, Limited, the Luton industrial instrument and automatic control manufacturers, on Monday of last week. The chairman, Cmdr. P. W. Kent, presided and the deputy chairman, Mr. T. P. W. Norris, was the guest speaker.

LORD CHESHAM, Joint Parliamentary Secretary to the Ministry of Transport, is making his second visit to the north-east coast within a month. He is to be the guest of honour at the annual dinner of the North-East Coast Institution of Engineers and Shipbuilders this evening (Friday) and is taking the opportunity while in the area of making a short tour of shipyards and engineering works.

OPERATIONS AT a new £A30,000 factory to be built in Australia by the English Steel Tool Corporation, Limited, Sheffield, a subsidiary of the English Steel Corporation, Limited, are due to begin in June. The company has bought three acres of land at Dandenong, 20 miles from Melbourne. Eight technicians from the company will go to Australia to help organize the production lines.

AN ORDER from Buenos Aires for a 2,200-kW alternator set has been completed in a very short time by Mirrlees, Bickerton & Day, Limited, Stockport, a member of the Hawker Siddeley Group, Limited. The equipment was manufactured and at sea before December, a total of two months from receipt of contract. The alternator set is driven by a Mirrlees KVSS-12 12-cylinder, V-form diesel engine.

UNDER A NEW AGREEMENT Cockburns, Limited, Glasgow, will manufacture certain of the products of Ateliers et Chantiers de Bretagne, Paris, including special compressors and evaporators, and will act as selling agents for these products in Canada, Australia, South Africa, and other parts of the Commonwealth. The French company will make Cockburn's products for marine, industrial, and atomic applications and will also act as Cockburn's selling agents in France and Algeria.

FIRST CONSIGNMENT of equipment under a £2,750,000 railway electrification contract awarded through the Polish Government agency, Elektrim, was shipped on December 18 by British Insulated Callender's Construction Company, Limited, one of the three British manufacturers who are parties to the agreement. The consignment consists of 127 drums of copper and cadmium copper trolley wire weighing about 170 metric tons. A second consignment of 200 tons was shipped on December 24. The remainder of BICC's commitments under the contract will be delivered at the rate of 100 tons per month over the next 18 months. The other parties to the agreement are the English Electric Company, Limited, and Metropolitan-Vickers Electrical Company, Limited.

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CL17

Board Changes

BIRFIELD, LIMITED—Mr. M. G. H. Brown has resigned from the board.

SOUTH WITBANK COAL MINES, LIMITED—Mr. S. S. Hoffmann has been appointed a director.

JOHN BULL RUBBER COMPANY, LIMITED—Dr. A. P. C. Cumming has been appointed technical director.

STERLING ELECTRIC HOLDINGS, LIMITED—Mr. K. Redgrave has been appointed deputy chairman.

JAMES HOWDEN & COMPANY, LIMITED—Mr. J. D. Howden Hume has been appointed joint managing director.

T. MITCHISON, LIMITED—Mr. W. W. Rounsevell, manager, has been appointed a director and general manager.

BRISTOL SIDDELEY ENGINES, LIMITED—Mr. J. F. Robertson, financial director and treasurer of the Hawker Siddeley Group, Limited, has been appointed a director.

M. L. HOLDINGS, LIMITED—Mr. Eric N. Mobbs has been appointed chairman and managing director of the company and its subsidiaries following the death of Sir Noel Mobbs.

LA MONT STEAM GENERATOR, LIMITED—Mr. William McKay, a director and chief engineer, has been appointed managing director in succession to Mr. A. E. L'Herminier, who continues as chairman.

LANDMASTER, LIMITED—Mr. John Howard has been appointed joint managing director. He was formerly export director and will now be responsible for all sales and allied matters. The company is a member of the Firth Cleveland, Limited, group.

S. GUTTERMAN & COMPANY, LIMITED—Mr. J. W. McFetridge and Mr. F. E. Oldham have been appointed to the board and elected chairman and managing director, respectively. Mr. T. B. Bond is now deputy chairman. Mr. E. J. Vamos and Mr. V. O. M'Quillin have resigned from the board.

CHAMBERLIN & HILL, LIMITED—Sir Frederick Scopes has joined the board and has been elected chairman. He is chairman of the Stanton Ironworks Company, Limited, and a director of Stewarts and Lloyds, Limited. His new appointment is in a personal capacity and there is no question of any financial connection between Chamberlin & Hill and the other two companies.

WESTWOOD, DAWES & COMPANY, LIMITED—Mr. John James Westwood has been appointed joint managing director and secretary, and Mr. John Jeremy Westwood and Mr. Allan E. Dawes have been appointed assistant managing directors. Mr. William Westwood has relinquished his post as secretary, but continues as chairman and joint managing director. Mr. Edward H. Dawes has resigned as a director.

JOSEPH SANKEY & SONS, LIMITED—Mr. H. F. Hodgson, managing director, has been appointed chairman and managing director of the company, which is a subsidiary of Guest Keen & Nettlefolds, Limited, on the resignation of Mr. K. S. Peacock, who remains on the board. Mr. G. B. Sankey has been appointed assistant managing director and Mr. W. W. Watt and Mr. F. W. J. Hibbard have been appointed directors. Mr. J. R. Martin has been appointed general manager of the Hadley Castle Works.

BRITISH ALUMINIUM COMPANY, LIMITED—Lord Plowden, who retired as chairman of the Atomic Energy Authority at the end of 1959, has taken up his appointment as chairman. Sir Ivan Stedeford, who had been chairman of the company since its acquisition by Tube Investments, Limited, and Reynolds Metals, of the US, has resigned from the board, but will become alternate director to Lord Plowden.

European Coal Output

THE appended figures relating to coal output and imports are taken from statistics issued from Geneva by the Coal Committee of the Economic Commission for Europe.

Tonnages are metric, and the number of underground workers employed relates approximately to the end of the month.

TABLE 1.—*European Coal Output (Metric Tons) and Employment.*

Country.	Output.		Underground employment.	
	October, 1959.	September, 1959.	October, 1959.	September, 1959.
Belgium	2,011,000	1,882,000	92,000	93,000
France	5,334,000	4,784,000	137,000	136,000
Spain	—	1,139,000	—	—
Netherlands	1,053,000	1,043,000	30,000	30,000
Poland	—	8,273,000	—	212,000
United Kingdom	16,776,000	20,260,000	521,000	525,000
Saar	1,486,000	1,354,000	—	—
Western Germany	10,649,000	10,285,000	—	295,000

TABLE 2.—*European Solid-fuel Imports in October, 1959, with Figure for September, 1959, shown in Brackets (Metric Tons).*

Importing country.	Coal and patent fuel.	Coke.	Lignite and brown coal briquettes.
Austria	268,000	59,000	87,000
	(278,000)	(66,000)	(77,000)
Belgium	370,000	13,000	6,000
	(367,000)	(12,000)	(7,000)
Denmark	224,000	117,000	21,000
	(211,000)	(110,000)	(19,000)
Finland	256,000	25,000	—
	(208,000)	(23,000)	(—)
France	948,000	386,000	36,000
	(906,000)	(348,000)	(37,000)
Greece	11,000*	1,000*	—
	(10,000)	(2,000)	(—)
Eire	130,000*	—	—
	(90,000*)	(1,000*)	(—)
Italy	658,000	13,000*	11,000*
	(675,000)	(6,000*)	(11,000*)
Luxembourg	21,000	321,000	11,000
	(20,000)	(312,000)	(10,000)
Netherlands	538,000	29,000	22,000
	(450,000)	(30,000)	(18,000)
Norway	39,000*	24,000*	—
	(37,000*)	(21,000*)	(—)
Portugal	30,000	3,000	—
	(14,000)	(—)	(—)
Sweden	191,000	184,000	2,000
	(168,000)	(158,000)	(1,000)
Switzerland	100,000	14,000	16,000
	(182,000)	(47,000)	(19,000)
United Kingdom	—	—	—
	(—)	(—)	(—)
Western Germany	701,000	44,000	361,000
	(749,000)	(47,000)	(402,000)

* Secretariat estimate.

EXTENSIVE FINISHING LINE equipment for the heavy plate mill at the new steelworks in Rourkela, India, of Hindustan Steel, Limited, has been provided by Schloemann Aktiengesellschaft, Düsseldorf. The contract called for the shipment to India of no less than 8,000 metric tons of material.

THE RIGHT TO DEVELOP water power in the Manapouri-Te Anau lake region for the establishment of an aluminium smelting industry in New Zealand has been obtained by Consolidated Zinc Proprietary, Limited, of Australia. The Prime Minister of New Zealand, Mr. Nash, said that the project would involve an investment of £100,000,000 and provide employment for thousands.

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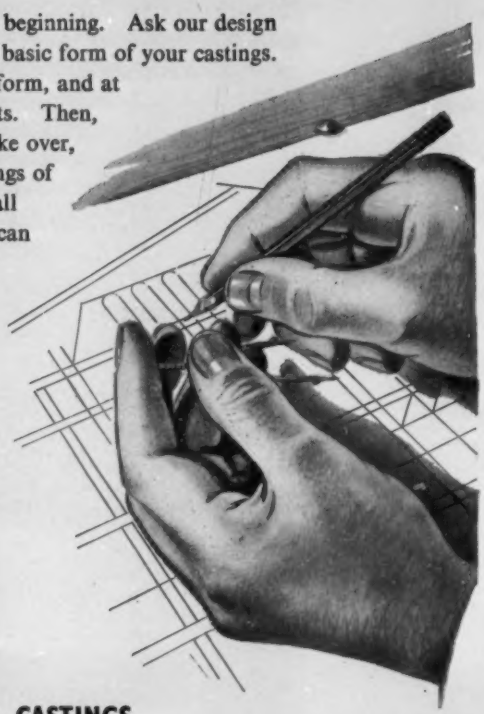
re-designing?

Start right at the beginning. Ask our design engineers to reconsider the basic form of your castings. Very often they can improve the structural form, and at the same time reduce complexity and cut costs. Then, when our metallurgists and foundry engineers take over, you'll be getting cheaper, more sound castings of unequalled quality and accuracy. This is what we call technical teamwork and we're proud of it. It can tackle *all* your casting problems and *solve* them.



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Increases of Capital

HAMPSHIRE METAL FINISHERS, LIMITED, Southsea, increased by £10,000, in £1 shares, beyond the registered capital of £1,000.

JIG BORERS, LIMITED, Markyate (Herts), increased by £40,000, in £1 ordinary shares, beyond the registered capital of £10,000.

KILDARE METAL FINISHES, LIMITED, Eastcote (Middx), increased by £900, in £1 shares, beyond the registered capital of £100.

BLYTHE COLOUR WORKS, LIMITED, London, E.C.2, increased by £100,000, in 4s. ordinary shares, beyond the registered capital of £525,000.

LINREAD, LIMITED, engineers, etc., of Birmingham, increased by £250,000, in £1 ordinary shares, beyond the registered capital of £250,000.

LANCASHIRE STEEL CORPORATION, LIMITED, Warrington, increased by £4,500,000, in £1 ordinary shares, beyond the registered capital of £9,000,000.

HEYGATE ENGINEERING COMPANY, LIMITED, Northampton, increased by £15,250, in £1 ordinary shares, beyond the registered capital of £11,000.

WATLING STREET HEAT TREATMENT COMPANY, LIMITED, Markyate (Herts), increased by £900, in £1 ordinary shares, beyond the registered capital of £100.

PLANNAIR, LIMITED, engineers, etc., of London, S.E.22, increased by £30,000, in £1 ordinary shares, beyond the registered capital of £50,000.

HALSEN ASBESTOS & ENGINEERING COMPANY, LIMITED, London, E.C.3, increased by £20,000, in £1 ordinary shares, beyond the registered capital of £40,000.

F. PRATT & COMPANY, LIMITED, engineers, etc., of Halifax, increased by £200,000, in 5s. ordinary shares, beyond the registered capital of £200,000.

BAGLAN ENGINEERING COMPANY (1919), LIMITED, Neath (Glam), increased by £85,000, in £10 ordinary shares, beyond the registered capital of £25,000.

JAMES STOTT & COMPANY (ENGINEERS), LIMITED, Oldham, increased by £102,900, in £1 ordinary shares, beyond the registered capital of £257,250.

NORTHERN WELDING COMPANY (NORTHAMPTON), LIMITED, Northampton, increased by £15,000, in £1 unclassified shares, beyond the registered capital of £5,000.

COCHRANE & SONS, LIMITED, shipbuilders, engineers, etc., of Selby, increased by £300,000, in £1 ordinary shares, beyond the registered capital of £75,000.

SUPPORT FOR ECSC STAND ON READAPTATION

DETERMINATION of the High Authority of the ECSC to defend its supranational powers and to present new proposals to resolve the deadlock on the Community's readaptation scheme was given strong support by the European Parliament during its session which ended last Friday. The new proposals are to be presented to the Council of Ministers on Tuesday. They are considered all the more necessary because 100 new applications for aid have recently been put forward—60 of them by Federal Germany in respect of miners who will be affected by the closure or reorganization of pits in that country.

The proposals aim at the continuance—beyond the deadline of February 9—of readaptation help in the form of tiding-over allowances, and grants for retraining and rehousing for workers affected by structural changes in the industries of the Community.

Canada's Record Steel Production

CANADIAN production of steel ingots in 1959 was 5,809,205 tons, 36.5 per cent. higher than the 1958 total of 4,254,607 tons. It exceeded by 12 per cent. the previous record total of 5,185,227 tons in 1956.

Pig-iron production in 1959, at 4,181,554 tons, gained 36.6 per cent. on the previous year's total of 3,060,962 tons and was 12.4 per cent. higher than the previous record total of 3,718,155 tons in 1957.

Reports from the industry are of heavy order-books and the high production level is expected to continue well past the first quarter of this year.

Rise in Some European Steel Prices

FRENCH iron-ore producers are understood to have laid new price-lists before the High Authority of the European Coal and Steel Community. They are based on the introduction of the new franc and rounding-off converted prices results in a price increase of about 1 per cent. The Belgian steelmakers, Cockerill-Ougrée and Böel, have increased the prices of their semi-manufactured products by 200 Belgian francs, or 4 per cent.

French steel producers in the rolled products sector have laid new lists before the Authority in which prices for tinplate and sheet iron have been rounded-off to lower figures. The Saar Dillinger Hüttenwerke concern has raised its per-tonne price for sheet iron from DM 806 to DM 866 and in Italy the Falck Company (Milan) has raised its band steel prices by 5 per cent., SIAC its thick plate prices by 5.4 per cent., and Cornigliano its prices for normal fine plate by 3 per cent. and for galvanized tinplate by 2.2 per cent.

Raw steel production in Belgium last year reached a total of 6,360,000 metric tons, or 8 per cent. up on the previous year. Highest-ever daily output—22,924 tons of raw steel—was recorded in the last month of the year.

Italy's 1959 steel output amounted to 6,760,000 tons, compared with 6,270,000 tons in 1958 and the 1957 record of 6,870,000 tons.

Ebbw Vale Council's Valuable Co-operation

VALUABLE operating experience with the L.D. steelmaking process will be gained by Richard Thomas & Baldwins, Limited, thanks to co-operation from the Ebbw Vale local authority. The company informed the council that it wanted to get the process in operation as quickly as possible so that its personnel could acquire the technical knowledge of the system before it was brought into operation at the new Spencer Works at Llanwern.

The contractors thought the process could be installed by June, but the fume-cleansing plant could not be installed until October. The council's Health Committee has therefore recommended that the new system be introduced without the ancillary fume-cleansing machinery so enabling RTB to get 12 months' experience of the L.D. process before the Spencer Works, where it will be used extensively, will come into operation.

Increased Sales by Aluminium, Limited

SALES by Aluminium, Limited, in 1959 totalled some 635,000 tons, an increase of 10 per cent. over the previous year. In a year-end report given in Montreal last week, the company's president, Mr. N. V. Davis, stated that the production rate of the company's Canadian smelters was being increased progressively over the next few months.

They were looking, he said, to an output of 675,000 tons in 1960—approximately 87 per cent. of present rated capacity. Production in 1959 was 520,000 tons.

According to a company official, the sales figures for 1959 represented consolidated sales to third parties of aluminium in all forms.